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IN EIGHT VOLUMES

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VOL. VIII, MISCELLANEOUS ARTICLES, AUTHORS' AND COMPLETE TOPICAL INDEX

DR. JACOBI'S WORKS

COLLECTED ESSAYS, ADDRESSES, SCIENTIFIC PAPERS AND MIS- CELLANEOUS WRITINGS

OF

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CONTRIBUTIONS
TO
PATHOLOGY

BY
A. JACOBI, M.D., LL.D.

VOL. V

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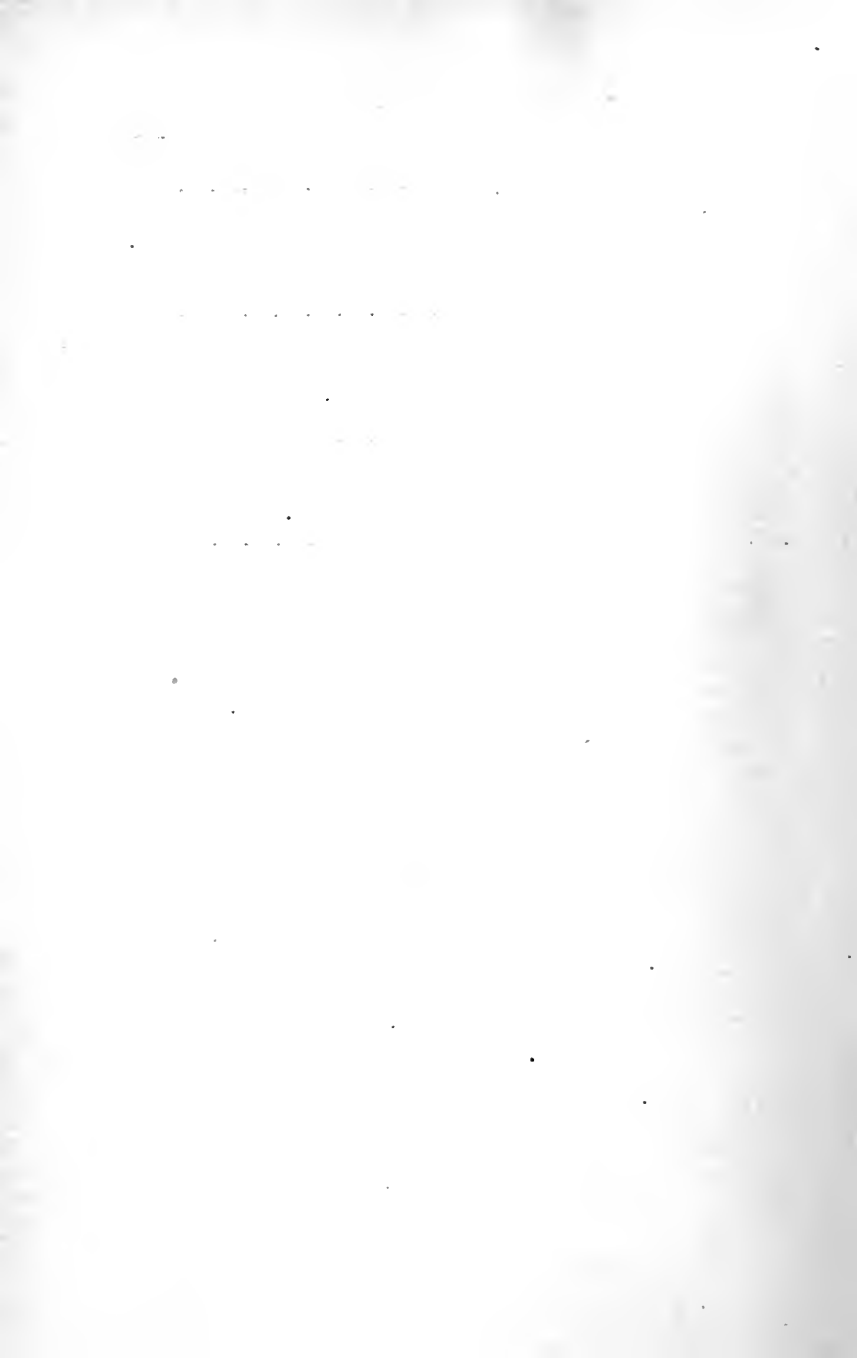
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THE ETIOLOGICAL AND PROGNOSTIC IMPORTANCE OF THE PREMATURE CLOSURE OF THE FONTANELS AND SUTURES OF THE INFANTILE CRANIUM

THE development of the various organs of the infantile body generally proceeds in an equable measure. Only the skull, with its contents, seems sometimes to form an exception to this rule. Compared with the whole body, the infantile head is large; its blood vessels are in due proportion to its size, and before the closure of the sutures, the blood vessels of the brain and of its membranes, finding less resistance from outside pressure, are expansible in a higher degree than are those in other parts of the body. In consequence, then, of increased upward motion of the blood, we find that in children the development of the skull, jaws, and teeth, and the frequency of inflammatory and exudatory diseases of the brain and its membranes, go hand in hand; they are co-ordinate effects of the same cause. The bones of the infantile body develop themselves with the same equability as its other parts. Protracted teething, retardation of the closure of the fontanel, retardation of walking, usually co-exist, and are not at all favorable symptoms, being too frequently the first signs of rachitis. Nor is prematurity of teething, of closure of the fontanel, and of walking, very rare. One fact, however, must not be overlooked here, viz., that the head and upper extremities, in their normal state, contain more lime, proportionately, than the pelvis and lower extremities. This fact is well understood, and explains the pathological alterations as well in the lower extremities as in the cranium, morbid tendencies going to develop mollification in the former, sclerosis in the latter. Indeed, all the

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cases of genuine sclerosis of the cranium, that have been reported in literature, seem to have commenced in early life.

Other exceptions to the rule, in which the skull is developed in proportion to the other bones, are frequently found, the causes of which can hardly be defined. Both parental constitution and maternal blood are, no doubt, of some influence. This is, however, not without restriction, as robust children are frequently born of weak mothers, and *vice versa*; but it has been shown by Spöndli¹ that large maternal skulls have a great influence on the development of that of the infant.

Climatic and typical peculiarities seem also to account for some of the differences in the formation of the cranium. Thus, Edwards² asserts that in the West Indies the coronal juncture is broad, and remains open for a longer period than in cold countries. As to the custom of the natives of pressing downwards the os frontis and os occipitis, he thinks it might be explained by the instinctive endeavor to effect an earlier closure of the fontanels and the cranial junctures in general. Schöpf Merei³ thinks himself justified in assuming that the large fontanel closes later at Manchester, England, than at Pesth, in Hungary. Many similar facts are brought to light by comparative observations. Thus, we are informed by Mauthner⁴ that skulls of Slavonian children are more compact, disproportionate, and clumsy, larger in every dimension and more subject to hyperostosis, than those of Hungarians. And Gratiolet observed that the cranial sutures close later in the white

¹ Heinrich Spöndli, "die Schäeldurchmesser des Neugeborenen und ihre Bedeutung." Zürich, 1857.

² L. A. Gosse: "Essai sur les déformations artificielles du crâne." Paris, 1855, p. 23.—Edwards: "History of the West Indies."

³ A. Schöpf Merei: "On the Disorders of Infantile Development, and Rickets, Preceded by Observations on the Nature, Peculiar Influence and Modifying Agencies of Temperaments." London, 1855, p. 116.

⁴ "Entwickelungsanomalieen am Kinderschädel. Oesterreichische Zeitschrift für Kinderheilkunde," Nov., 1856, p. 52.

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race than in the black one, and that the coronal suture, being the first to ossify in negroes, is the last to do so in Caucasians.

It is to be considered a law, that the incisors cut, before the closure of the large fontanel takes place, this being followed only by the ability of walking. In the average, the first incisors make their appearance at the age of six or seven months, the large fontanel is closed at twelve, walking ensues at thirteen months. By closure of the large fontanel, however, I do not mean its entire ossification, as this is consummated only with the third year. Some weeks after birth, the large fontanel has a size of a square inch, or nearly so; somewhat less in small and weak children, somewhat more in large and robust ones. From a merely pathological point of view, we take the closure of the fontanel to be complete, when the fibrous bridge between the osseous margins gives way no longer to the pressing finger, and no pulse can be felt through it. The fontanel is seldom closed before the first incisors have broken through; walking is rarely possible before the closure of the fontanel. Sometimes, however, I have seen children walk without a single tooth in their mouth. Merei relates the case of a child who walked at fifteen, had his first incisors at sixteen, and whose large fontanel had the size of about one-half of a square inch at nineteen months of age. Nevertheless, the child was lively, sensitive, not rickety—which seems fully to prove that irregularities in the development of the osseous system may occur, sometimes, without any morbid symptoms.

The best evidence of a normal development is the regular appearance of the teeth. Eichmann⁵ reports four hundred observations on dentition, from which he draws the following conclusions: The first inferior incisors break through between the 28th and 32d week; the first superior ones, between the 36th and 40th; the first anterior molar teeth, between the 48th and 54th week; the canine teeth, between the 22d and 24th month. At 27 or 30 months

⁵ Schmidt's "Jahrbücher der in-und ausländischen gesammten Medicin." 1853, No. 12.

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there are 20 teeth formed; about this time, or shortly after, the large fontanel has finished its entire and permanent ossification.

Sometimes, however, and indiscriminately so with robust or feeble children, the first incisors cut in the fourth or fifth month. Merei reports the case of a child which had his first incisor at three months of age, and had fourteen teeth when eleven months old. In newborn children teeth are not frequently found. We are told⁶ that Louis XIV., Richard III., and Mirabeau were born with teeth; one case is reported by Churchill; in another case: Whitehead,⁷ in order to facilitate suckling, removed from the inferior jaw of a newborn child two teeth, which were reproduced simultaneously with the appearance of the canine teeth. One case is reported by Fleming, one by Denman, nineteen by Haller. Nor are remarkable cases of unusually protracted dentition more frequent. Among Eichmann's 400 cases, there are a few in which the first tooth cut at the twenty-second month; in a case reported by Churchill, it cut in the seventh year; and Merei knew a child whose large fontanel closed at four years of age, but whose mouth was still toothless at six.⁸ We have observed, in the "German Dispensary of the City of New York," a child of thirty-four months, without a single tooth, and whose fontanel did not even begin to close. The record of the children's department of the Dispensary contains another similar case of a child two years old. There are, moreover, irregularities sometimes, defying accurate explanation, but worthy of notice. There is, in the written records of the meetings of the Society of German Physicians (February 27th, 1857), the case of a man of 63 years, whose large fontanel was open; also a case of a girl of 14 years, of feeble constitution, with well-developed mental faculties, and a large head. Her father has been syphilitic sometime during his life. Frederick C. Stahl relates the case of a man of 50 years of age, and Eulen-

⁶ Fleetwood Churchill, M. D.: "Diseases of Infants and Children." Second Am. Ed., p. 417.

⁷ Merei, p. 118.

⁸ L. C., p. 119.

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berg and Marfels⁹ report the same anomaly to have occurred in a cretin of 20 years of age.

The following results of Eichmann's seem to be worthy of a particular consideration: Of twenty healthy and robust children, the fontanel was closed in ten at from eleven to thirteen months; in five at thirteen; in two at fourteen; in two at ten; in one at fifteen. In fourteen of them, the first teeth cut at from six to eight months; in four at from eight to nine; in two before the sixth month. Consequently there is in healthy children an interval of from four to seven months between the cutting of the first incisors and the closure of the large fontanel.

Of eight feeble or sickly, but not rickety children, the large fontanel was closed in six at from eleven to thirteen; in two at from thirteen to fourteen months of age. In seven of them the first incisors cut from four to seven months before the closure of the fontanel; in one the cutting of the first tooth, which took place at thirteen months, was directly succeeded by the closure of the fontanel.

Of eight rickety children, the fontanel in three was closed in the thirteenth month; symptoms of rachitis developed themselves immediately afterwards. The incisive teeth came at the regular time; the other ones too late. In three the closure of the fontanel took place between the sixteenth and nineteenth month, the first tooth having cut at twelve months, and being followed by the rest in rapid succession. In one the large fontanel was open at nineteen months; the first teeth cut at the regular time, but at eighteen months there were only eight of them formed. In one, rickety also before the eleventh month, the fontanel was not closed, and the mouth toothless, at the age of twenty-five months.

A. Schöpf Mercei and J. Whitehead have published in their first report on the Children's Hospital of Manchester, England,¹⁰ their observations on the closure of the large fontanel, made in children from five months to three years

⁹ Hermann Eulenberg und Ferdinand Marfels, "Zur pathologischen Anatomie des Cretinismus." Wetzlar, 1857.

¹⁰ Journal für Kinderkrankheiten, 1857. March and April.

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of age. They state at once, that children of one and one-half, two, or three years, in whom the large fontanel was found open, showed a very unfavorable general development; they being very late in teeth, feeble as to their locomotory organs, and exhibiting anomalies in the size and shape of cranium and thorax, and symptoms of universal rachitis. Some children who had been walking from their eleventh, twelfth, or thirteenth month and had some sixteen teeth, had their fontanel open when eighteen months old; in others the reverse took place, the fontanel being closed before the appearance of the very first tooth. Among the whole number of well-developed children, observed by our authors, the fontanel was:

At the age of 6-7 months closed in 3, open in the rest.

"	8	"	"	8	"	"
"	9	"	"	2	"	"
"	10	"	"	2	"	"
"	11	"	"	4	"	11
"	12	"	"	11	"	3
"	13	"	"	13	"	3
"	14	"	"	13	"	2
"	15	"	"	9	"	0
"	15-18	"	"	9	each,	except 2.

After the eighteenth month the fontanel was not found open in any well-developed child.

Among viciously developed children the fontanel was:

At the age of 7 months, closed in 1, open in the rest.

"	11	"	1	"	"
"	12	"	3	"	14
"	13	"	1	"	12
"	14	"	5	"	11
"	15	"	4	"	12
"	16-36	"	13	"	14

In a very small number of children, who exhibited general state of very bad development and general rachitis, the fontanel was even found open in the third or fourth year of age.

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From these facts the conclusion may be safely drawn, that the large fontanel is closed, in well-developed children, at or before thirteen months of age, and that it is open at the same period of life, or later, in a large majority of badly developed children. It must not be supposed, however, that the diminution of the size of the fontanel takes place gradually. Schöpf Merei and Whitehead prove by a large number of observations on healthy and well-developed children that the fontanel is largest at from five to seven months, the size being from one to two inches from one margin to the other; Liharzik¹¹ arrives at a similar result, and Elsässer¹² considers the age of nine months as the period at which the large fontanel ceases growing, and commences its rapid ossification.

The completion of the cranial sutures is often delayed in spite of a normal condition of the brain. Sometimes the ossification in newborn children is deficient; in such cases it may have started from the usual points, but the bones are thin, their periphery fibrous, or there are fibrous gaps in the osseous structure. Both the circumference of the skull, and the general development of the children, may be entirely normal in such a state of the osseous structure of the cranium. Sometimes, however, abnormalities are found, as for instance, hydrocephalus. In some cases, the fault has been attributed to constitutional diseases of the parents, to pathologico-anatomical peculiarities of the maternal pelvis. Abnormal sutures also may be found, the ossa frontis, occipitis, temporum parietalia, remaining each divided as in the fœtal state. Or there are the so-called ossa Wormiana, results of normal ossification, but proceeding from an unusual abundance of starting points, in groups of sometimes such a remarkable number, that Meckel met with and counted two hundred of them in one individual.

¹¹ "Franz Liharzik, das Gesetz des menschlichen Wachthums und de unter der Norm zurückgebliebene Brustkorb als die erste und wichtigste Ursache der Rhachitis, Scrophulose und Tuberculose." Wien, 1858.

¹² C. L. Elsässer, der "Weiche Hinterkopf." Stuttgart und Tübingen. 1843.

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It is, however the premature solidity of the cranial bones which we consider as our special subject in these pages. Sometimes it is inborn, and the result of inflammations suffered during foetal life; in such cases an osseous elevation is sometimes felt along the sutures. Otto records in his report¹³ on the specimens of the Anatomical Institute of Breslau, the cranium of a newborn child, with very small eyes, face and orbits were extremely small, the frontal bones firmly joined, formed a prominent edge. Dr. Haase¹⁴ met, in a newborn child, with a piece of bone, entirely filling and covering the large fontanel. Trista¹⁵ delivered a woman of a feeble and lean child, whose head showed the exact form of a sugar-loaf, the eyes were oblique from upwards and outwards to downwards and inwards, the nose was flat, and had only one aperture, this malformation being accompanied with hare-lip, fissure of the palate, and imperforate anus. In the hospital of Shitomir, Russia, a case of inborn idiotism¹⁶ has been observed, in which the cranium was four and one-half inches in length, and three and three-fourth inches in breadth, and was in several places two-thirds of an inch thick. Dr. Shnetter, of New York City, has seen three cases of congenital complete ossification of the sutures and fontanels; the heads being hard and well rounded. The delivery was difficult in all of these cases, and the infants did not reach the end of their first year. Another case has been reported by Allen.¹⁷ All the sutures were ossified, the cranium was like that of an adult, dense and solid, and had to be perforated before it could be born.

The size and symmetry of the skull depend upon both

¹³ 1830.

¹⁴ "Gemeinsame deutsche Zeitschrift für Geburtskunde." iv. 3.

¹⁵ Rust und Casper "Kritisches Repertorium für die gesammte Heilkunde." xxviii. p. 121.

¹⁶ "On the state of national health and efficiency of the civil hospitals in the empire," in the year 1855. St. Petersburg. 1856. p. 271.

¹⁷ New Orleans Medical News and Hospital Gazette, March, 1857.

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the advancement and seat of the ossification of the sutures, and the adjustment of those parts which are not ossified. For the growth of the flat cranial bones which commences from the sutural substance, ceases mostly after the ossification is consummated. Gibson and Sæmmering were the first to understand the importance of the substance of the sutures, considering it to be the matrix of the growth of cranial bones; but Hyrtl was the first to show that pathological forms of the cranium might depend on the premature closure of single sutures. Fr. C. Stahl¹⁸ considers the ossification of the sutures to be rather the final end of the whole gradual configuration of the cranium and cerebrum. Ludwig Fick¹⁹ thinks proper to deny positively any influence of the cranium on the cerebrum.

We have stated that the growth of the flat cranial bones mostly ceases after ossification of the sutures is consummated. This is an undoubted fact, but is nevertheless not without limitation. For it is an old remark of Köliker's, that after the ossification of the frontal suture in children, the frontal bone always increases in size, particularly between the tubera. And Huschke²⁰ arrived, from very exact and numerous measurements, at this result, that the cranium is increasing in size up to the sixtieth year, a period when the sutures are perfectly closed. The cause of this general result is found in the fact, that the osseous substance is reabsorbed from the interior, but reproduced from the exterior periosteum. Nevertheless, it may be stated as a rule, that generally after the ossification of the sutures and fontanelles is complete, the brain cannot increase its volume except by forcing asunder the sutures, or by the reabsorption of the inside of the cranium.

The variety of forms of the cranium produced by the earlier or later, partial or total synostosis of all or some

¹⁸ "Neue Beiträge zur Physiognomik und pathologischen Anatomie der idiotia endemica." Erlangen. 1848.—Damerow's "Zeitschrift für Psychiatrie." 1854. xi. 4.

¹⁹ Ludwig Fick, "Neue Untersuchungen über die Ursachen der Knochenformen." Marburg, 1859.

²⁰ "Emil Huschke, Schädel, Hirn und Seele des Menschen und der Thiere, nach Alter, Geschlecht und Race." Jena, 1854.

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of the sutures is very large. For discerning these various forms, R. Virchow²¹ has successfully adopted a terminology similar to the one used by Retzius, for discriminating the varieties of races by their skulls, which we reproduce, although being well aware of partial objections made to it.²²

1. Macrocephali, large heads; general circumference of the head too large. Hydrocephali, waterheads.

2. Microcephali, small heads; general circumference of the head too small. Nannocephali, dwarfheads.

3. Dolichocephali, longheads.

a. Simple dolichocephali; synostosis of the sagittal suture.

b. Leptocephali, narrow heads; lateral synostosis of the frontal and parietal bones.

c. Sphenocephali, cuneated heads; synostosis of the parietal bones, with elevation of the region of the large fontanel.

d. Clinocephali, saddleheads; synostosis of the parietal and sphenoid bones.

4. Brachycephali, shortheads.

a. Simple brachycephali, bigheads; synostosis of the parietal bones with the occipital bone.

b. Plagiocephali, oblique heads; synostosis of the frontal with one parietal bone. Where a considerable adjustment takes place: Platycephali, flatheads.

c. Oxycephali, pointed heads, sugarloaf heads; synostosis of the lambdoid and squamous sutures.

We have found that ossification of the sutures leads not only to asymmetry of the cranium, but to the gradual cessation of the growth of the cranial bones. The cerebral functions depend to a great extent upon the size and symmetry of the cranium; in cases of considerable diminution and asymmetry, we are almost certain to find that not only

²¹ "Verhandlungen der physikalisch-medicinischen Gesellschaft zu Würzburg, 1851, vol. ii. 230.—1852, vol. iii. 247.—1856, vol. vii. 199.—R. Virchow: "Gesammelte Abhandlungen zur wissenschaftlichen Medicin." Frankfurt, 1856, p. 891.

²² J. Christ. Gustav Lucae, "zur Architectur des Menschen-schädels, nebst geometrischen Originalzeichnungen von Schädeln normaler und abnormer Form." Frankfurt, 1857.

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the intellectual faculties, but also those of locomotion and sensibility are injured. Convulsions, deafness and dumbness, failing of the sexual instinct are known to be frequent consequences of an early and extensive synostosis of the sutures. Where it is limited to one side or locality, an adjustment is possible in the direction of the yielding, unossified parts; in such cases the cerebral functions may be nearly or wholly normal. Other less favorable cases look like the one of osteosclerosis cranii, not long ago reported by Schützenberger.²³ The disease lasted about four years, before the continually increasing compression of the hard, compact, and eburneated cranium succeeded in effecting the death of the patient, who had endured all his life frequently repeated faintings, a long series of epileptic and tetanic attacks, abnormal irritability, mental weakness, and, at last, idiocy.

With the only exception of the macrocephalic—hydrocephalic—form of the cranium, there is none which has been studied with so much eagerness and success, as the microcephalic one, particularly in its relation to the diminution of mental faculties. Baillarger²⁴ saw, in a village of southern Switzerland, three microcephalic idiots whom their mother reported to have been born with their skulls perfectly closed and solid. Two other children of hers, who were well developed bodily and mentally, had their large fontanel open for a long while after birth. Similar facts he learned from another woman, who was mother of one microcephalic idiot, and of some other children of normal development. Furthermore, he describes the cranium, in his possession, of an idiotical child, 4 years old. Its dimensions are very small indeed, the largest circumference not being thirty-five centimeters. The coronal suture had disappeared entirely; no less so an osseous prominence. Only the lambdoid suture was slightly discernible.

Similar cases have been observed by others. Vrolik,²⁵

²³ Archives, générales, 1856. No. 8.

²⁴ Gazette des hôpitaux, 1856. No. 91.—Bull. de l'Acad. XXI. pp. 950, 954, 1856.

²⁵ "Verhandelingen der K. Akad. der Weetenschappen, 1. Deel." Amsterdam, 1854. Schmidt's Jahrb., 85. 3.

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of Amsterdam, knew an idiotical boy of 7 years, whose cranial sutures had entirely disappeared.

The skull was asymmetrical, the face appearing as it were to be bent from the left to the right side, the occipital portion from the right to the left. On the left side the fossa cerebelli was larger, the cavity of the hemisphere of the cerebrum smaller; the bones were also thicker on the left side of the cranium than on the right. The frontal bone was flat, the frontal tubera very little prominent; the parietal bones high but short; on the left parietal bone, and on some other parts local rarefaction of osseous substance; the occipital bone oblique and flat. There were no digitated impressions on the inside of the cranium, all the sutures almost completely closed. With the exception only of the mastoid foramina, the apertures of the emissaria Santorini were very narrow, but the carotid canal was wide. The ethmoid bone was narrow, no juncture visible between the anterior and middle clinoid processes. The oval, anterior condyloid, and auditory foramina were very large, the round one small. Upper jaw, nasal and jugular bones were remarkably developed. The hemispheres of the cerebrum were so much shortened, as to leave the cerebellum partly uncovered; gyri few and incomplete, sulci flat, olfactory nerves thin. In the cerebrum the right hemisphere, in the cerebellum the left one, was largest. Pons Varolii was narrow, the oblongated spine disproportionately thick. The lateral ventricles were expanded by serum to such a degree as to leave between the ventricle and the coronal suture only a thin transparent pellicle of what was formerly normal cerebral substance. Corpus striatum and thalamus were abnormally flat.

Cruveilhier reports the case of a child 18 months old, without any discernible sutures. There was, besides, instead of the normal external occipital protuberance and the semicircular line, a transverse, very sharp osseous prominence. The vertical diameter of the cranium was as short as one inch. There had never been even a vestige of intellectual faculties.

After all, premature cranial ossification, although there

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may be many other causes of idiocy, is deserving of every consideration.

The normal human brain differs from the animal not only in its relative volume, but also in its growth. Besides, the fontanel of the human cranium is not found in animals, with the exception only of a few varieties of apes, who have, for a short time after birth, small and rapidly ossifying fontanel. Therefore Baillarger, taking into consideration both the growth of the brain and the premature ossification of the cranial sutures, thinks himself justified in comparing microcephalic idiots to animals. Gratiolet did not even stop here, but asserted in the meeting on August 25th, 1856, of the "*Académie des Sciences*," that there is a direct relation between the earlier or later ossification of the sutures, in the different races and types of mankind, and the height of their intellectual faculties. He states, as we have mentioned above, that the cranial sutures close later in Caucasians than in Negroes, and particularly, that the coronal suture ossifies early in Negroes, late in Caucasians. For this reason a proportionally late ossification of the coronal suture seems to be favorable to intellectual development. The high forehead also, of the Caucasian, and the low one of the Negro race are evidently depending on this physiological fact, although it may be stated that the synostosis of the sutures is not the only cause of cranial difference in the races, the various characters of the crania, as they are found in different races, being partially formed before synostosis of the sutures is complete.²⁶

A frequent result of cranial premature synostosis appears to be deafness and dumbness (two such cases have been reported by Virchow) and cretinism.

Eulenberg and Marfels made a post-mortem examination in a case of cretinism. The cranium and brain were asymmetrical, gyri of the left side broader, straighter, more simply formed. Even more difference was shown in the chiasma, which was one-twelfth of an inch broader on the

²⁶ E. Huschke, "über cranio-sclerosis totalis rhachitica und verdickte Schädel überhaupt, nebst neuen Beobachtungen jener Krankheit." Jena, 1858.

right side; nerv. opt. and corp. striat. more developed on the right side; the cortical substance remarkably thin in proportion to the medullary substance. The right side of the cerebellum was softer and smaller than the left. There was a far-spread hyperæmia around the spheno-basilar synostosis which was present in this case; and which, for this reason, is considered by the reporters as the result of an inflammatory process, the origin of which is to be traced back to fœtal life.

Even more frequently than the above-mentioned abnormalities has epilepsy been observed to be a frequent consequence of precociousness of cranial synostosis. In a great number of epileptics the form of the cranium is anomalous; thus Rieken already noticed, in a man suffering from epilepsy, a lower situation, larger size and malformation of all the parts of the right half of the head.²⁷ In proportionally few cases it is too large, hydrocephalic; in most of them it is too small, and spherical or pointed. The most important characteristic, however, is asymmetry, the head appearing, as it were, compressed from a lateral, anterior or posterior direction. Among forty-three epileptics, recorded by Müller, of Pforzheim,²⁸ the heads of thirty-nine were asymmetrical; in the majority of them there was, besides, hyperostosis of the cranium. The older a case of epilepsy, especially if it dates from the first years of life, the more the cranium will be dense and eburneated. Epilepsy originating at this early age, is considered to be the most critical and incurable, leads often to, or is complicated with, idiocy, and shortens the duration of life.²⁹ We have been informed by Dr. Schilling, of New York, of the case of a girl eight years old, who has been suffering for some years past from epilepsy which, led by anamnestical facts, he does not hesitate to trace back to premature synostosis of the cranial junctures; we have ourselves been attending for four or

²⁷ v. Gräfe's und v. Walther's "Archiv. für Chirurgie und Augenheilkunde." XVII. 2.

²⁸ R. Virchow: "Handbuch der speciellen Pathologie und Therapie," vol. iv. i. 268.

²⁹ Romberg: "Lehrbuch der Nervenkrankheiten," p. 697.

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five months a girl of fifteen years, whose menses were regular and pretty copious, who has been suffering since her second year, once, twice, or three times every day of her life from epileptic fits, which we can, by every possible evidence, attribute to the same cause.

Epilepsy is rare in newborn children—frequent after the first dentition. Hyperostosis of the cranium, particularly in cases dating from early childhood, seems also to prove that too rapid and abundant ossification of the cranial bones, before the brain has obtained a sufficient growth, and the compression of the brain produced thereby, are among the causes of epilepsy. Every case of this kind is illustrated by Travers,³⁰ who reports the case of an epileptic boy suffering from compression of the brain, which was caused by a particle of the fractured cranium. There was no other fit, after the fractured bone had been removed.

According to Chazeauvieilh,³¹ of sixty-six cases of epilepsy, eighteen occurred in the first lustrum, eleven in the second, eleven in the third, ten in the fourth, five in the fifth, four in the sixth, one in the seventh, two in the eighth, one in the ninth, two in the tenth, one in the twelfth: that is to say, more than twenty-seven per cent. occur under the first five years, and probably even between the second and fifth year of life. This is just the period of infantile development, in which irregular ossification may begin to prove dangerous. For, as Romberg emphatically asserts, the orgasm of the brain, inclosed as it is in unyielding osseous walls, cannot but favor the transmission of remote irritations to the corpora quadrigemina and the oblongated spine, and thereby produce irregular reflected motions. On this principle, convulsions are the habitual consequences of cerebral hypertrophy, which is frequently combined, too, with hypertrophy of the cranium.

Every symptom in all the objects of the foregoing ex-

30 B. Travers: "A further Enquiry concerning Constitutional Irritation and the Pathology of the Nervous System, p. 285.

31 "De l'Epilepsie considérée dans ses Rapports avec l'Aliénation Mentale." Arch. Génér., 1825, p. 73.

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position can be explained, as it were, by a relative hypertrophy of the brain; that is to say, by a disproportion between the closed and narrow skull and the inclosed and growing brain. Such, however, is the similarity between the symptoms of some of the most different cerebral diseases, that a distinct diagnosis of the pathologico-anatomical alterations is not always easy, sometimes very difficult. Lænnec,³² in referring to Jadelot's remarks on the disproportion between skull and brain, has already acknowledged that he sometimes made serious mistakes in the diagnosis of hydrocephalus internus. He confesses that in a number of cases he met with no water at all, but only with a remarkable flattening of the gyri, which seems fully to prove that the brain was compressed, by its volume being too large and its growth too active; and next, with an extraordinary firmness and elasticity of the cerebral substance. Next to Lænnec, in 1824, Hufeland communicated to the profession his observations on cerebral hypertrophy, which he, too, declared to have been often confounded with hydrocephalus internus. It was he who established a new fact met with in every such case, viz., the *cerebral hernia*; that is to say, he showed, that in every post-mortem examination in these cases, the compressed, elastic brain springs forth through the incisions made into the membranes. He is, however, always speaking of an *abnormally large brain within a normal skull, of real cerebral hypertrophy*; and identical with his cases, are those reported by Scoutetten, Meriadec, Lænnec, Burnet, Papanovine, Cathcart Lees, and Barthez and Rilliet.

Some years ago, we had occasion to observe three unmistakable cases, the reverse of those treated of above—that is *cases of an originally normal brain in an abnormal cranium*, this having remained *too narrow in consequence of premature synostosis of the fontanel and sutures*. This narrowness, however, was the only anomaly; for the process of ossification would not have been irregular at all, if it had ended some months later; there was no constitutional

³² Journal de Médecine, Chirurgie et Pharmacie, 1806, vol. xi., p. 669. Revue Médicale, 1828, "observations pour servir l'histoire de l'hypertrophie du cerveau."

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disease of any kind, not even of hyperostosis, or of preceding inflammation. The three patients, who came under my observation in August, 1851, in the fall of 1855, and in August, 1856, were children—two ten, and one eleven months of age; the first one a male, the other two females. All of them were *well developed, had been robust and apparently always healthy*. The third one was said to have, in the last months preceding her death, from time to time, cried vehemently and suddenly, without any manifest cause. In neither of these cases was it possible to perceive weakness of intellect, apathy, somnolence, and feebleness of the extremities, all of which symptoms Cathcart Lees considers as indispensable signs of genuine hypertrophy of the brain. In the first case, it was stated that the child lost his habitual brightness and liveliness about a fortnight before the symptoms became severe; in the other cases, this failing could be observed but a day or two before symptoms of depression of the brain were visible. The children grew sleepy, almost soporous, the pupils enlarged; vomiting soon followed. From time to time, they exhibited, especially the third patient, light intermediate signs of irritation. Contractions of the extremities came next, and, in short, all the graver signs of depression of the brain. The soporousness increased so as to become complete unconsciousness, every sensual function being totally paralyzed; and at last death ensued with clonic convulsions. The picture we have given of this disease is the almost exact likeness of the *last stage of the inflammatory and exudatory diseases of the brain and its membranes in general*. Its distinct diagnosis is, therefore, sometimes impossible, and always difficult. The present state alone of a patient, who lies prostrate, with all the symptoms of depressed brain, will not enable a medical man to get a clue to what has preceded. Sometimes he will obtain anamnestical facts, the best of which is, at all events, *the knowledge of the condition of the large fontanel and cranial junctures*. In this manner, we were enabled to make an exact diagnosis in the cases of our last two patients. We found that in the children, ten and eleven months old, the large fontanel was entirely closed, and no pulse could be

felt through it. In the last case, the parents, without any suggestive questions of ours, and only induced to do so by our examination of the fontanel, told us that the fontanel of another child of theirs, who had died two years before, at the same age, and under the same symptoms, was also closed long before death.

In the first and third cases we were allowed to make a post-mortem examination. The result was alike in both of them. There was nowhere a pathological alteration to be found, except the *abnormal solidity of the cranium* and the following state: The cavity of the cranium was completely and compactly filled up by the brain; the membranes were pale. *No signs of inflammation or only hyperæmia.* The sinus narrow; *gyri flattened*; the substance of the brain dense, elastic, difficult to cut; of an apparently considerable specific weight. The gray substance was whitish; fluid in the ventricles not remarkable in quantity. There was *no disproportion* between the different parts of the brain, a symptom which never fails in genuine cases of cerebral hypertrophy; this being but an increase of the white substance, while the gray one remains unaltered, and affecting neither the middle part of the brain nor the cerebellum, while the pressure of the unyielding cranium, when no adjustment has taken place, will sometimes, but not always, operate in every direction, and affect every part of the brain, which may be sound in every other respect.

The abnormal state of the cranium and the brain which we treat of, is almost overlooked by the best authors on diseases of children, Rilliet and Barthez. There is only a short notice in their book, relating to premature closure of the cranium as being a cause of induration of the brain, and they seem to be so little aware of the intrinsic difference between induration of the brain and its hypertrophy, that they treat of both of them in the same short chapter (the fifth of their first volume). So does Churchill, l. c. p. 178. Even Förster,³³ one of the most excellent authors on pathological anatomy, scarcely mentions our sub-

³³ A. Förster, "Handbuch der pathologischen Anatomie," ii. p. 427.

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ject, so that in treating of "induration of the brain," he says: "Increased consistency of the whole brain, or total sclerosis, is a normal occurrence in old age, and of the same frequency, but less importance, in intoxication by lead, in typhus, cholera, puerperal peritonitis, scarlatina. Only in intoxication by lead, where induration is combined with atrophy, it reaches such a height as to affect seriously the cerebral functions. In other cases, the increased consistency of the cerebral substances is of some interest only when found in post-mortem examinations, and is usually produced by copious exudations, leaving the brain deprived of its parenchymatous serum. High degrees of total sclerosis are met with only in atrophy of the brain.

Cases of sclerosis of the brain are met with, sometimes, in reports on post-mortem examinations; cases, too, of premature closure of the cranial junctures have been communicated to the profession, but in very few of them has an attempt been made to elucidate the evident relation between these two anomalies.

F. Weber³⁴ reports a case of sclerosis of a part of the cerebrum, which we are hardly entitled to consider as belonging to the class of cases forming the subject of our treatise. The author is not aware of the importance of the early or late closure of the cranial junctures, but thinks it a remarkable fact, that sometimes small, puny children, with small heads, exhibit cranial bones reaching a high degree of osseous development, while in other cases, in large, strongly built children, the cranial bones were thin and easily cut with a pair of scissors. Thus, in the report of a post-mortem examination of a child who died at the age of seven months, after having suffered from convulsions for half a year, he entirely omits to state the condition of the fontanel or cranial sutures. The case was that of sclerosis of the right hemisphere, which felt to the knife like cartilage; particularly its gray substance was dense and hard even where the white substance showed the average softness of a normal cerebrum. Nor was the structure of the parietal bones like that usually found

³⁴ F. Weber, "Beitraege Zur Pathologischen Anatomie der Neugeborenen," Kiel, 1851, i. p. 31, 46.

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where premature ossification of the sutures has taken place; the bones showing rather a soft hyperæmic thickening than a solid hyperostotic condition.

Of more value for our purpose is the case of "sclerosis cerebri" reported by Stiebel, Jun.³⁵ It is the case of a girl, paralyzed in her left side after a severe attack of convulsions occurring in her third year. About that time the general health of the child does not seem to have been influenced by the disease, which made progress during the next half-year to such an extent that the left half of the body being paralyzed, the right was affected with clonical spasms, and psychical action considerably diminished. At the same time contractures were observed on the side affected with spasms; but notwithstanding all this, the bodily development, the embonpoint, had not been affected. No sooner than a year afterwards, the child was emaciated, the other symptoms remaining the same throughout the whole time, until the child died at the age of more than five years. The post-mortem examination of the cranium and cerebrum gave the following results: The skull was very thick, from one-sixth to one-third of an inch, like that of adults; the dura mater thickened to at least as much as twice its normal size, firmly adhering to the skull, and, on the right side, to the brain. The blood vessels of the arachnoid membrane were much injected with blood, and there was a jelly-like exudation all over the surface of the cerebrum. The left hemisphere was of normal consistency and pretty well filled with blood; its gray and white substances were very distinctly separated from each other. The left ventricle contained a large amount of serum, foramen Monroi was dilated. The right ventricle was somewhat enlarged; its walls were normal. The right cerebrum, with the exception of the anterior lobe, and the inner part of the middle lobe, was unaltered in its shape, but of a dense, hard, and nearly cartilaginous consistency; it was of a whitish yellow color and could be cut into very thin, blueish, transparent slices. The microscopical examination exhibited a proportionately small number of

³⁵ Journal für Kinderkrankheiten, 1857, Jan. and Feb., p. 76.

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cerebral ganglia, very few varicose cerebral fibres, but a large number of amorphous masses interspersed with some fat globules. In the gray substance the capillary system was developed to an unusual extent.

W. Hughes Willshire³⁶ reports the case of a sickly, punny, serofulous girl, of a year and five months, who was said to have fallen some time ago and hurt her head. The fontanels were closed, the eyes squinting, and the tarsal margins somewhat inflamed. The child could not lift her head, the dorsal muscles appeared to be somewhat opisthotonic, and the upper part of the body was drawn backwards. Such was the state from the 17th of January to the 27th of February, when the child fell sick with variola; convulsions, stupor, and pulmonary œdema soon ensued, and a speedy death followed. The post-mortem examination gave the following results: Cranium was completely ossified, dura mater firmly adhering to the bones, the gyri were narrow, pressed into each other, sulci partly obliterated. The meningeal blood vessels were overfull of blood, on some spots there was some milky exudation along the course of the vessels. Brain was solid to the touch; it was hard and heavy after being taken from the skull; when incised, it appeared condensed, compressed; most so the white substance. Most solid were the thalmai optiei, much less so the cerebellum. In the ventricles there was some serum, and a little exudation on the basis.

One very good observation was published, some time ago, by Prof. Mauthner, of Vienna.³⁷

CASE.—Mary F., $3\frac{1}{2}$ years old, is said to have suffered, $1\frac{1}{2}$ years ago, from convulsions caused by a fall on the occiput. She has been sickly ever since. When taken to the hospital, she exhibited the following state and symptoms: The child is emaciated, feeble; hair of a light brown color, cranium remarkably small and hard, particularly so in the occipital region; the countenance has a suffering expression; lips and tongue are red. The child sucks her thumb continually. The abdomen is con-

³⁶ London Lancet, Oct., 1853.

³⁷ Oesterreichische Zeitschrift für Kinderheilkunde, Sept., 1857, p. 561, "sclerosis cerebri ex microcephalia."

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cave; the lower extremities are drawn to the abdomen; pulse thin and much accelerated; sleep restless. Evacuations dry, rare.

Treatment.—Four leeches on the mastoid region. Carb. Magn. to facilitate defecation.

Two days later, June 11th.—The child moans frequently; sleeps very little. No evacuation. Sulp. magn. \mathfrak{ss} ., aq. \mathfrak{ss} iii.

The following day one evacuation. Constipation again to the 16th, when jalap \mathfrak{ss} s. was required to open the bowels. No change in the other symptoms, only the emaciation and feebleness of the patient are increasing. Three convulsive attacks, of only two or three minutes each, occurred during the night.

July 2d.—The child continues to moan and whine. Hands cyanotic; abdomen hard, somewhat inflated; skin dry. One convulsive attack in the morning. Sucks her thumb. Constipation of the bowels. Carb. magn. gr. x., aq. \mathfrak{ss} ii.

July 5th. The child is very low; has fallen off considerably.

July 14th.—Since yesterday ten thin, greenish-yellow passages, mixed with mucus. Hands cold. Dec. salep \mathfrak{ss} ii., pulv. r. ipecac. gr. x, syr. simpl. \mathfrak{ss} ii.

July 18th.—Collapse increasing. Diarrhœa but little better. Pulv. Dov.

The child grew worse from day to day, emaciation going on in rapid progression; appetite lost; eyes hollow; face and extremities cyanotic; temperature of the skin low; passages not so numerous, but thin and mucous. After some days of constant sopor, the patient died on the 25th of July.

Post-mortem examination.—The corpse is very much emaciated; abdomen discolored, greenish, concave; the extremities are flexible. The cranium is of unusual compactness and smallness. The integuments being removed, the distance from the root of the nose to the external occipital protuberance is twenty-two centimeters, from one ear to the other $23\frac{1}{2}$. The circumference of the cranium is forty-two centimeters. While the cranium is getting

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opened, a great deal of serum is escaping. *The membrane is thick, adheres firmly to the cranium, and can only with some difficulty be removed. The fontanel has disappeared entirely,* the sutures are found to have been ossified long ago. The left hemisphere is of very small size; its gyri are hard, of a dirty yellow color, showing signs of atrophy. Between the layers of the pia mater are four ounces of a thin dark serum, mixed with blood. The pia mater of the right hemisphere is slightly injected with blood. *The cerebral substance is pretty dense.* The right lateral ventricle is not dilated. All the nerves originating in the brain are of a considerable toughness, as well as the flattened gyri; pons and cerebellum are normal; *medulla oblongata very hard*; some fibrine coagulated in the longitudinal sinus. The cranium is as thick as one centimeter about the squamous part of the temporal bone. Its longitudinal diameter is 15 centimeters; the transversal, $1\frac{1}{2}$.

A very interesting and instructive case, which has been our fortune to meet with, is the following:

George Z., of Forsyth street, eleven months old, a robust child, was not known to have ever been sick. He became restless and feverish on the first of November, 1857, with augmented temperature of the head and slight vomiting. His parents, believing him to suffer from "dyspepsia," administered an emetic. On the following day he spontaneously vomited twice, the general state remaining as above-mentioned. Bowels open and water passed freely. We were requested to see the patient at seven o'clock, p. m.

Present state.—Slight clonic convulsions of the muscles of the face and superior extremities; forty breathings in a minute, pretty regular; pulse contracted, 140; pupils somewhat dilated, react on the influence of sudden light, but are floating for a while afterward and dilate again; conjunctiva scleroticæ slightly injected with blood; occiput abnormally warm; hands and feet of normal temperature. The child in general was well developed, the head somewhat large; six teeth cut some months ago; the gum is swollen. *The sutures and the large fontanel perfectly closed,* and have been so, as far as I could learn from the very intelligent relatives, for at least three months.

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Diagnosis.—Cerebral sclerosis from mechanical compression of the brain, caused by premature closure of the cranial junctures, increased by cerebral hyperæmia consequent on dentition.

Prognosis.—Probably fatal; the patient may recover from this attack, but only to die by a future one, or at best will become idiotic.

Treatment.—Calomel, jalap, aa. gr. j., to be taken every hour; head to be kept under ice.

The convulsive attack lasted for three hours, the muscles of the inferior extremities becoming also affected; there was only one short intermission after copious vomiting. Patient vomited once more at eleven o'clock, p. m. At midnight, fifty-two breathings in a minute, somewhat irregular; pulse as before, 172. Temperature of the occiput even higher than before; conjunctiva scleroticæ more injected. The child no longer fully unconscious.

Nov. 3d, 8:30 o'clock, a. m.—Pulse contracted, somewhat irregular, 144; fifty breathings, interrupted by sighing. The child is prostrate, spiritless, with an expression of pain about the corrugatores of the eyebrows. The right eye more injected than the left one; no more convulsions; bowels have been open three times; water has been passed several times. Patient vomited once, not long after midnight; has taken the breast four times, and is constantly looking around for water.

Four o'clock, p. m.—Took the breast and drank several times; vomited four times; left hand is constantly kept on the parietal bone; pulse as before, 144; respiration sometimes sighing, thirty-eight; eyes hollow, considerably injected with blood; occiput abnormally warm; feet cool, hands cold.

Treatment the same. Hot poultices of mustard and linseed on feet and legs.

Ten o'clock, p. m.—Vomited twice, each time after drinking; took the breast several times; had no convulsions, but shook his limbs under the bed-clothes, from time to time, as if from impatience. Respiration, as above, 35, pulse 130. somewhat irregular; body warm all over, with the exception of the nose, which was cool. Feels every slight touch;

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screams abruptly and violently when his eyes are forced open. During sleep, the eyelids half opened; pupils small. After being awakened from his heavy sleep, his pupils are a little dilated; contract by the action of light, but afterwards float, and dilate again.

Treatment.—Calomel gr. j., extr. hyosc. gr. $\frac{1}{8}$ every hour. Ice continued.

Nov. 4th, half-past eight o'clock, a. m.—Pulse and respiration as yesterday: 155, 54. No change at all, with the exception of the patient's vomiting no longer; he is alternately either awake or unconscious, or in a kind of heavy sleep; had two evacuations of the bowels, passed water freely. Feet cool.

Six o'clock, p. m.—No change; no convulsions; no vomiting. Nitri. Sod. $\bar{\text{ij}}$. extr. hyosc. gr. iiss. inf. digit. (e gr. xij.) $\bar{\text{ij}}$. a teaspoonful to be taken every two hours. Ungt. hydrarg. for external use.

The flexions and extensions of the right superior extremity kept on and increased, the child grew more restless, threw his head from one side to the other, respired more frequently and irregularly. Nevertheless, about one o'clock, a. m., he took the breast, but only for a minute. The increased irritation was soon followed by unconsciousness and sopor, which lasted for about an hour. With the usual symptoms, œdematous rhonchi, etc., death ensued at half-past two o'clock, a. m., November 6.

Post-mortem examination, four o'clock p. m., thirteen and a half hours after death. Front side of the corpse pale, back side red and brown, by hypostasis; conjunctiva scleroticæ not injected with blood. Galea aponeurotica pale throughout, except on the occiput, where it was suffused with blood, more so than could be explained by hypostasis alone. All the integuments being removed, about *fifteen white and unusually dense insular spots*, of a diameter of from a twelfth to three-quarters of an inch, become visible on the frontal and parietal bones. Cranium not abnormally thick, occipital bone even rather thin; besides, it is hyperæmic, and shows on its inside *digitated impressions* of such an extent as are met with only in adults. The insular spots, being *the places of increased local ossifi-*

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cation, are just as manifest inside as outside. Of *the frontal suture there is no sign*. Between the frontal and the parietal bones, there is no interval, the *large fontanel having totally disappeared*. Where the large fontanel ought to be, the coronal and sagittal sutures are not wholly ossified, but they cannot be disjointed by any means. Ossification is perfect everywhere else.

The *dura mater cannot be torn from the cranium*; the membrane is of such a thickness and adheres so firmly to the cranium, that it has to be separated from the bone by means of the scalpel. The sinuses are full of blood; so are all the blood vessels of the pia mater, particularly on the cerebellum; nowhere extravasated blood or any pathologico-anatomical alteration, such as tubercles, exudations, etc.

The *brain large, heavy, solid*, proportionally developed in its several parts; *gyri* numerous and *solid*, some of them evidently *flat*, particularly so on the superior surface of the hemispheres. The gray substance is less hard than the white, but nevertheless is tough and elastic. This is found to be throughout the condition of the cerebral substance. When it is laid open by long incisions, no blood is seen, except on pressure. *Ventricles narrow*, contain no serum. *Pons Varolii and medulla oblongata are most solid and dense*; they are difficult to cut. The cerebral substance, after having been outside the cranium and handled and turned for at least an hour, remains pretty hard and solid.

Although the diagnosis, in the foregoing case, was clear and fully proved to be correct by the post-mortem examination, there are some interesting facts apparently contradictory. After the first attack of convulsions, no other occurred for three days, almost up to the hour of death; constipation and anuria, so common in cerebral diseases, were also absent.

Between our last case and the one of Prof. Mauthner there is one important similarity. The thickness and firm adhesion of the *dura mater* along the sutures and in the region of the large fontanel, in both cases, seem to prove, that a *chronic congestive or inflammatory* process was both

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the cause of the pathological alteration of the membrane itself, and of the abnormal deposition of phosphates and carbonates in the flat cranial bones. No such alteration of the membrane was found in our former post-mortem examinations, at least to no remarkable degree. This difference is strikingly confirmed by the condition of the blood vessels. In some cases, they *were filled with blood, in other ones the membranes were pale and bloodless.*

In looking over the series of cases and observations referred to, another highly interesting fact will strike us. We have reported the case of a child whose brother died at the same age, with the same symptoms, the fontanel being closed and the sutures perfect. Baillarger, too, reports the cases of three microcephalic idiots in one family. Nothing of the kind, however, occurred in our last case; the boy had sisters—the oldest one nine, the youngest one three years old—the heads of all of whom are well developed, and even large. The youngest girl is reported to have been remarkable for the pulsations of the arteries, being for a long period visible through the integuments of the large fontanel. Therefore, *in some cases of premature closure of the fontanel and the cranial junctures, an hereditary or family influence seems to be absent, while in other ones it cannot be denied.*

We were so fortunate as to assist Dr. J. Kammerer at the post-mortem examination of a man, thirty-six years old, who died from *sclerosis cerebri*. The facts resulting from this examination, Dr. Kammerer, who attended the deceased for some years, kindly allowed us to publish. We feel bound to do so, because this case is most apt to illustrate the subject of this essay, and because, as one of our best authorities on diseases of the brain, Prof. Leubuscher, asserts, cases of genuine sclerosis cerebri are exceedingly rare; so much so, that the two cases diagnosed, dissected, and published by Prof. Frerichs,³⁸ of Breslau, and the twelve other cases of sclerosis of the brain or spine, they being cases only of partial, even merely local sclerosis, collected by Dr. Valentiner,³⁹ are the largest number

³⁸ Haeser's Archiv. x. 334.

³⁹ Deutsche Klinik, 1856, Nos. 14, 15, 16.

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known. It may be stated that only in one of the twelve cases, which occurred in a man of fifty-three years of age, the cranial bones were found to be hypertrophied, and the meninges hyperæmic and somewhat infiltrated. In this single case both halves were equally affected.⁴⁰ The short but complete history of the case, communicated to us by Dr. Kammerer, is as follows:

CASE.—Deceased, a tailor, is said to have been always healthy. Only two years ago his countenance began to show a cachectic color; in the epigastric region, a frequent soreness was complained of, which used to be complicated with or followed by vomiting, and the patient grew morose, taciturn, peevish. About the same time, or shortly after, a creeping pain was felt, sometimes in the hands and fingers, sometimes in the feet and toes, which changed very often, and used to alternate, as to its seat, and thereby induced the patient to consider it as rheumatic. His physician, however, was soon led to attribute these symptoms in the peripheric nerves to a cerebral origin, especially when slight and occasional signs of paresis became visible. Four or five months ago, the patient had an attack of syncope, total loss of the mental, sensory, and motory functions coming on suddenly. After this attack, he was sick for about five or six weeks, the main symptoms being a small and feverish pulse, and all the cerebral symptoms of typhoid fever, but no typhous alterations at all in the abdominal organs, and no trace of critical secretions. He never felt well afterwards; nearly every week an attack of sudden syncope occurred similar to the one mentioned above, after which the patient used to feel as usual. But the paretic symptoms in the extremities increased, the interval between the attacks grew shorter, and they were preceded by a violent headache, especially in the occiput. In the last weeks preceding death the attacks occurred almost daily, even sometimes every day, and they were preceded by the most intolerable headache, which forced the patient to the most heartrending outcries, and was mitigated by nothing except a close and hard pressure on all sides of

⁴⁰ Hirsch, "ein Fall von sclerosis cerebri." *Prager Vierteljahrschrift*, 1855. iii. 124.

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the head at once; they were followed by copious sweats. In the last week of life, the patient was scarcely able to lie down; if he did he was sure to feel worse; and he walked about his room all night. There were from eight to twelve attacks every day, of the same kind, as described above, the sweat being followed by a vehement shaking and chilliness. In one of these attacks the patient died.

Post-mortem Examination, Dec. 9th, seventeen hours after death. Galea aponeurotica pale, bloodless; cranium dense, particularly so the frontal and parietal bones. Both of them are very concave, extending very far, the one forwards, the other backwards. The region of the large fontanel, where the coronal and sagittal sutures meet, depressed; the sutures are visible only at this meeting point; everywhere else they have entirely disappeared. The form of the cranium narrow and long (*dolichocephalus*, Virchow), diploe very much developed, *impressiones digitatæ* very deep and large, particularly so on the inside of the os frontis and the lower part of the os occipitis. The cranial impressions of the sinus sulci venosi uncommonly deep. Foramina emisaria are not found at all. The margins of the impressions digitatæ, the juga cerebralia, uncommonly sharp-pointed, particularly so on the basis cranii. Sella turcica of an extraordinary size, and with sharp margins. The whole inside of the cranium and the dura mater bloodless; less so the arachnoidea, without being, however, hyperæmic. The brain stiff, tough, hard; gyri hard, extremely flat all over the cerebral surface; the inner and upper edge of both hemispheres very sharp, their inner surface very flat and hard. The gray and white substances contain very little blood. The white substance looks discolored, showing a dirty grayish tint. Thin slices cut from the hemispheres are tough, may be suspended by one end without breaking or even lengthening; the commissures prove hard and tough. The lateral ventricles very narrow, without any serum; the third and fourth ventricles normal but narrow. The brain throughout of the same density and toughness as its surface; pons Varolii and medulla oblongata even more so. No disproportion, as to size, between the gray and white substances.

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This is, undoubtedly, an evident and very instructive case of *sclerosis cerebri*. The history of the deceased's cranium and cerebrum, as may be concluded from the results of this post-mortem examination, is briefly this: The abnormal state of the cranium has been the first false step in the general development, the large fontanel and the cranial junctures closing too early. This is proved to be a fact by the depression of the upper frontal and parietal region, by the adjustment which has evidently taken place in the frontal and occipital directions, and by the dolichocephalic shape of the cranium. From this time, that is, from the third or fourth quarter of the first year of life, dates the disproportion between skull and brain. It is probable that deceased, when a child, was so fortunate as to escape difficult dentition, and severe symptoms of irritation produced thereby; if he had not been so, there is a great probability that he would have died in early childhood. Deceased is said to have been intelligent when attending school. This is not uncommon in cases where the above-mentioned disproportion advances slowly, and has not been complicated with irritative symptoms. As long as life continued there was a constant antagonism between cranium and cerebrum. It is not improbable also, that in the last years of life renewed depositions of calcareous matter have taken place, more so, probably, on the basis, than on any other part of the cranium. The frequent attacks to which the patient was subjected, exhausted, at length, the power of resistance, which is limited as well in the nervous, as in every other system of the organism.

Real hypertrophy of the cerebral substance is out of the question. We have remarked above that cerebral hypertrophy affects but the white substance, not the gray, and the large hemispheres only, not the cerebellum, and cannot but produce a disproportion between the two. No such disproportion exists in our case. Besides, the shape of the cranium and the other facts alluded to are against such an assumption.

After the foregoing expositions, it appears that the prognosis of the kind of cerebral sclerosis described is highly unfavorable.

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According to the present symptoms in each case, whether a distinct and perfect diagnosis be made or not, either a stimulant or an antiphlogistic treatment will seem to be indicated. The former will aggravate the condition of the patient in every case, which is combined with congestion of the brain or its membranes, while theoretically it should be adopted only where the main symptoms are those of perfect depression. The debilitating course of treatment may be able, at once with the diminution of the dimensions of the body in general, to remove, for a while, the disproportion between the brain and the cranium. Taken theoretically, all this is right and promising of success. But we cannot continue to debilitate without killing the patient by exhaustion or by meningeal exudation, which so frequently is the result of general and continued inanition.

Finally, we wish to state emphatically that we do not mean to assert that every child whose fontanel is ossified prematurely, must and will fall sick and perish with cerebral symptoms at an early age. For the premature ossification of the fontanel and sutures need not of itself absolutely and always produce congestion of the brain or its membranes, which often becomes the occasional and last cause of death. But what I assert and wish to be understood to say is this, that every child, whose fontanel and cranial junctures have been prematurely closed, and who falls sick with symptoms of cerebral irritation or depression, *is predestined to certain death*. We do not know if such has been the opinion of Condie,⁴¹ who has only a few remarks on our subject, stating that "when the growth of the cranium ceases, while that of the brain continues, the morbid phenomena resulting from the compression of the brain, which invariably results, may certainly be, to a great extent, abated, the comfort of the patient increased, and life prolonged by a proper hygienic course of treatment—but all hopes of effecting a cure must be abandoned."

In giving, therefore, the preceding exposition, we have

41 F. D. Condie: "A Practical Treatise on the Diseases of Children." Fourth ed., 1854, p. 388.

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been well aware of our inability to advance, in the least, therapeutics; our only desire was to call the attention of the medical practitioner to a subject of the highest etiological, diagnostic, and prognostic interest.

Hitherto, we have taken into consideration only such cases as have exhibited the fullest extent of their morbid disposition, in consequence of their complete morbid development. One case, however, of any disease, never appears exactly like the other, the peculiarities of each individual being as marked in disease as in health. Thus, in one case, fontanels and sutures may be equally and firmly closed, the cranium equally hard in all its parts, the brain under equal pressure in all directions; in another case, the sutures will appear ossified or ossifying, but the large fontanel will be found open, perhaps pulsating; nevertheless the pressure on the cerebral substance will be of nearly equal severity, because the fontanel alone offers the compressed brain no opportunity to escape the surrounding wall.

It is but proper that a number of cases should be observed, in which the process of ossification has not run its full course and secondary sclerosis of the cerebral substance has not been fully developed. We are not always gratified, naturally, with the observations of genuine interesting cases, for death often occurs from a trivial and apparently uninteresting cause. A child will sometimes exhibit for months the symptoms of the approaching full development of the morbid cranial condition, without our being able, while relieving it for a short time, to cure its disease. Such children are usually well developed, both mentally and bodily, they are fleshy and lively, but sometimes for a short period appear puffed in the face, and their eyes are too brilliant. Their heads are generally warm to the touch, sometimes hot, particularly so the occiput; it feels harder and heavier than it normally does, and is moved to and fro on the pillow, while the child is in a supine position; there is always a relief visible, after the child has been raised, and held in an upright position, and some cold application made to the head. The child is restless sometimes for weeks or months, without any visible

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cause, particularly at night; congestion of the head will sometimes manifest itself as a general flushing of the face, sometimes in single red spots of half an inch or an inch in diameter, dispersed on face and forehead, and disappearing as quickly as they spring up, and showing themselves again unexpectedly, for a few minutes. In a boy of five months, who has been under our care for some time, this symptom is remarkably developed, the child showing these red marks, especially nights, together with other symptoms of congestion of the brain, restlessness, high temperature of the head, and sometimes drowsiness. The very best symptom, and of the greatest value for differential diagnosis, is found on the examination of the outside of the cranium. Besides the points alluded to above, the sutures will be found to have fully or nearly disappeared, the fontanel diminished in size, and the cranium in a state of hyperæmic sensibility and warmth; hyperæmia of the cranium appearing as well in company with hyperostotic development, as with rachitical mollification of the cranium (craniotabes).

Wherever this general state is found, we must have the greatest apprehensions of the future safety of our patient. The maldevelopment will be found as impossible to stop or improve, as to reduce the amount of phosphate of lime, to further its excretion, to enlarge the calibre of the cerebral and cranial veins, to diminish the size of the arteries, to remove, in short, all the possible causes of too rapid ossification. Leeches, cold, calomel, mustard, and a good many other remedies, antiphlogistics, resolvents, refrigerants, antiplastics, derivatives, should be resorted to cautiously, rationally, repeatedly. They are followed by good results. *But the majority of such children will die.* Only such children may be saved as will escape for the first years of life the common diseases of infancy and childhood, inflammations, exanthems, fevers. And of such children, again, the majority will consist of microcephali, blockheads, idiots, epileptics.

Every febrile disease in childhood tends to produce nervous symptoms. Hyperæmia of the brain and its membranes, and convulsions, being well known to follow

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many instances of local inflammatory diseases in other organs. Wherever, then, cranial and cerebral troubles have been greatest before, they may be expected to be fostered and increased by every febrile attack or disease invading the organism. In cases of a slight commencement of cranial ossification, where the single bones of the cranium are not too firmly attached to each other, febrile attacks may be less injurious, although every one, while bringing about congestion, will bring new materials to the completion of the unfortunate osseous hyper-development. Wherever the ossification of the suture and fontanels is in an advanced stage of development, one single attack of fever, or of any inflammatory disease, even for a day, may produce congestion to the brain and its membranes, in a sufficient degree to cause death by hyperæmia and pressure.

We were called to 239 Broome Street, on February 17th, 1858, to see a boy four and one-half months old, who was said to have had a slight cough for some days and had grown worse the last night. *Status præsens* at four P. M.: child not very robust, but well-developed; head appears to be somewhat small in proportion to the body. The main symptom is a considerable dyspnœa, respiration 58, pulse 130, nostrils move up and down, thorax but slightly, breathing seeming to be painful. Sensorium clear, head hot, face pale, on the forehead some small red spots going and coming from time to time. No pulse can be felt through the large fontanel, all the sutures are ossified. Auscultation yields bronchial rhonchi, equally over the whole thorax percussion gives no result. The bronchitis present would of itself give no bad prognosis, but the peculiar configuration of the head, the premature ossification of the sutures and fontanels, made the prognosis very unfavorable. The parents were told from the beginning that the case was likely to end unsuccessfully.

18th, Nine, P. M.—Respiration 48, pulse 140, dyspnœa not so great as yesterday. Bronchial sounds as above; percussion dull over the lower lobe of left lung. Sensorium not free. The child somnolent from time to time, sighing; the face pale, pupils react but slowly, and will float a little after having been suddenly exposed to light.

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Temperature of the head little higher than normal. Slight contractions in the thumb and fingers of both hands, elbow a little bent, angles of the mouth sometimes undergo slight involuntary motions.

Six, P. M.—Respiration 40, difficult, loud, pulse 154. Œdematous rhonchi in the bronchia. Hands and feet cold, nose cool, head hot, but pale. Eyes slowly rolling, pupils a little dilated, react very slowly, and very little to the light; contractures of the hands stronger than before; toes also contracted by the flexors. The child is not conscious, apparently moribund.

The child had an attack of clonic convulsions in all the four extremities, lasting about five minutes, about eleven, P. M. Afterwards the permanent contractions returned, the unconsciousness increased, coma set in, pulmonary œdema increasing. Another attack of convulsions occurred at four, A. M., on the 19th, and death five minutes afterwards.

Post-mortem examination not permitted.

S. F., of 100 Mott Street, a girl of nineteen months, well developed, who had never been troubled by any kind of disease, even the fifteen teeth having cut without any difficulty, was seized with intermittent fever, having been exposed to malarial influence, on the 18th of April, 1858. The attack did not appear to be a very severe one, but the child did not recover her cheerfulness for the whole day nor the following night; on the next day another attack occurred, severer than the first, and with more dangerous consequences. The child remained either restless or drowsy, scarcely opening the eyes, the cheeks flushed, head burning. After the third attack of fever, on the twentieth, we were called to see the patient, who appeared to be in a critical situation. The child was drowsy, when roused, fell quickly again into what might have been taken to have been a sound sleep, sighed often, had a pale face, a hot head, contracted pupils. The cranium was hard and dense to the touch, no suture could be felt, no fontanel distinguished from the surrounding bones. The size of the head, which was round, was not abnormal. Lungs not affected, heart healthy, liver not abnormal, spleen a little

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increased in size. Being aware of the importance of the osseous structure of the cranium, after having seen the cases referred to above, we considered the main symptoms to be congestion of the brain and its membranes induced by the intermittent fever. Thus the indications following therefrom were, the suppression of the malarial disease, that is to say, the prevention of another febrile attack; and the removal of the secondary congestion. A large dose of sulph. chin. was given the other morning before the usual time of the attack, and no particular symptoms referable to malarial influence seemed to rise. The second indication was fulfilled by applying two leeches to the forehead, by constantly applying cold and administering calomel.

The history of the disease is very short indeed. Leeches and cold did not appear to be employed without success, for the heat of the head diminished. But the drowsiness, interrupted by restlessness, of the child became no less. The pupils remained contracted, the face pale; hands and feet began to grow cold during the night of the 20th. Slight twitchings of the angles of the mouth, and slight contraction of the fingers of both hands were first observed in the early hours of the twenty-first. When aroused, the child took a spoonful of water, which was swallowed slowly and with difficulty. In the morning of the same day a dose of quinine was administered, to avoid a new check from the attack of intermittent fever that was expected; no symptoms of fever could be observed. But meanwhile the whole aspect of the case was somewhat changed. An attack of clonic convulsions about eight, A. M., of the muscles of the forehead, face, neck, of the upper and lower extremities, in short of all the voluntary muscles of the whole body, seemed to exhaust the child rapidly and leave her in a worse state than before. Although the convulsions lasted for only ten minutes, they left the head hot and face red for more than an hour; after which time the face grew deadly pale and the pupils began to slowly dilate. The contraction of the hands grew stronger, even the elbows were inflected. Contraction of the toes was visible and did not cease before death ensued. Hands and feet were cold, the drowsiness became sopor, the sopor

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coma. Swallowing was no longer possible, the senses were deprived of any action. Another slight but general attack of clonic convulsions took place at five, P. M., symptoms of pulmonary œdema set in and rapidly increased, and half an hour later the child died.

The post-mortem examination was made on the following morning, only the head being permitted to be inspected.

Galea aponeurotica thick and pale, cranium in its greater part of a livid color. All the cranial junctures firmly joined, the fontanel no longer covered by a fibrous membrane, but of osseous structure. The anterior part of the cranium had a thickness of from an eighth to one-sixth of an inch, the posterior of from one-twelfth to one-eighth. The surface of the brain was full of blood, the meninges copiously injected. No extravasation nor exudation was found between the membranes. The gyri of the hemispheres of the cerebrum were flattened and approximated, the gray substance was thin, the white substance of a somewhat yellow tinge without bloody points when incised and even compressed. White substance hard and tough; thin slices cut from it might be suspended without breaking. Ventricles and foramen Monroi narrow, and contained no serum. Cerebellum was softer but scarcely more filled with blood, except the meninges which were also injected with blood. Pons and medulla oblongata were of no uncommon density.

A boy living in No. 203 Stanton St., the fifth child of a family with scrofulous taint, but without any decided and severe local disease, showed early the conformation of the head often referred to. The fontanel was felt not to be ossified at all, but the fibrous covering was thick, allowed of no pulsation to be felt through it, and the sutures were firmly and solidly closed. The child next in age to this one, and sixteen months older, showed the reverse of cranial development, the head being large in size, and the sutures and fontanel open up to an advanced age, as is commonly found in rhachitic children. Our patient, up to nine months of age, had never been sick except from slight intestinal and bronchial catarrhs. When nine months of age he showed symptoms of intestinal catarrh, in a

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severe form, which was not cared for; as he had no medical attendance. Bronchitis supervened after a week and lasted for six days, during which period the child had medical care and recovered, but was much exhausted. During all this time his mental faculties did not seem to be much affected. The bronchial symptoms had scarcely disappeared, and convalescence was apparently established, when the child again showed symptoms of a severe gastro-intestinal catarrh, vomiting and diarrhœa suddenly arising again and exhausting the little patient completely. One single fit of general clonic convulsions closed the scene on the last day of July. The post-mortem examination gave some very instructive results, the principal ones of which are given in the following: The cranium was of the peculiar conformation which forms the subject of our exposition; it was fully developed, round, symmetrical, but hard and solid, the sutures were ossified, the large fontanel firmly covered although not fully ossified. The thickness of the bones a little greater than normal. The brain did not fully fill the cranial cavity, the meninges were much injected with blood, and a copious serous exudation was found, in equal proportions, to be contained in the arachnoidean sac. The brain itself nowhere soft; the gray substance was of no uncommon density, but a little thinner than usual. The white substance was of normal color, but of abnormal consistency, the substance proving hard, dense, and tough, both when touched in a mass and when cut in slices. Lateral ventricles were narrow and contained hardly a drachm of serous fluid. No particular abnormality was found about the cerebellum.

This last case affords a particular interest, from the fact that the compression of the brain produced by the early ossification of the cranium had no direct consequences, and produced no direct cerebral symptoms. The intestinal catarrh beginning the series of diseases which terminated fatally, appears to have, altogether with the general bulk of the whole body, gradually diminished the size of the brain. Thus when bronchitis and fever set in, with the congestion of the meninges consequent thereon, the brain was subjected to such pressure from the cranium as to be unable to allow of any dilatation of the blood vessels.

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Up to this time, then, no exudation of the arachnoideal sac had taken place. But when a sudden attack of cholera infantum exhausted the child, and rapid diminution of the body and brain ensued, the general inanition and the existing disproportion between the skull and the suddenly diminished volume of the brain resulted in the copious exudation of the arachnoideal sac. Nevertheless this pathological process had no influence in changing the former condition of the brain. The pressure of the cranium on the brain had previously produced the hardness and toughness alluded to, which was still found after a part of the cerebral substance had been resorbed in the course of several exhausting diseases. Thus this case does not strictly belong to that class of morbid symptoms directly produced by the disproportion between the cranium and the compressed brain, for there have been neither symptoms of compression nor death from this cause; but even this case tends to show the continued and persistent effect on the cerebral mass which is produced by the early closed cranium; the consistence of the cerebral substance being unaltered even after the pressure was removed.

The other cases are those in which the acute disease was only indirectly fatal, the slowly developed but unchangeable disproportion between cranium and cerebrum giving rise to those severe symptoms which produced death. But without the acute disease supervening, the children would either have enjoyed comparative health for months or even years, until death had occurred from some other cause, or they would have survived to take the chances of their general growth and development, liable to the pressure on the sclerotic cerebrum, by the early ossified, hyperostotic cranium. This, however, seems to be certain, that in the first case a slight pneumonia, in the second a few attacks of intermittent fever, would not have been sufficient to produce the fatal symptoms which resulted in death, without the presence of just such pathological anomalies as we have here described; and further, that the fatal prognosis pronounced from the beginning, was justified, we do not say by the final result, but by the prominent pathological facts resulting from the examination during life.

We desire, then, to remind our readers of the former

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conclusion, that children whose fontanels and sutures are prematurely ossified, and who manifest symptoms of cerebral irritation or depression, are destined to an early death; and further, from the arguments superadded we would deduce the following inference, that in all cases of children, whose cranial junctures are prematurely ossified, any acute or febrile disease invading the system, slight though the acute affection may be, offers a most unfavorable prognosis. At all events we feel justified in drawing the conclusion, that henceforth many cases of infantile diseases which terminate unexpectedly and unfavorably, will be at least explicable to the medical mind, and further that, to give more exactness to diagnosis, and more certainty to prognosis, the condition of the cranial fontanels and junctures in general will be deemed worthy of the closest attention and examination.

INVAGINATION OF THE COLON DESCENDENS IN AN INFANT, WITH REPEATED HEMORRHAGES IN THE COLON TRANSVERSUM

INVAGINATION of the intestines, from a merely anatomical point of view, is not a rare occurrence. Before and in the moment of death, the paralysis of the muscular tissue of the intestines progressing by degrees and sometimes unproportionally, invaginations of the jejunum and ileum are very frequent; indeed, so much so as to be a very common result of a great many post-mortem examinations. The same alteration is not of the same frequency in the living, but wherever it occurs it is generally known to be a dangerous disease. It occurs, in almost all the cases, in the jejunum and ileum, the *intestina crassa* being as it were exempt. The reason why this is so, is: 1st, the vast development and considerable strength of the muscular fibres of the *intestina crassa*; and 2d, their firm adhesion in the fossa iliaca. Now, in very young children, neither of these things are found; in them the muscular tissue of the colon is not very much developed, nor are their strong adhesions in the fossa iliac. Therefore it is only natural that there should be, in infants, cases of invagination of the *intestina crassa*, so very unusual in older children or in adults. Nevertheless, there are not many observations of such cases, and the literature of the subject is very poor, so much so that a number of even the best manuals on diseases of children do not mention it. For this reason the profession is under greatest obligation to Rilliet, who collected more than a dozen of well-authenticated cases, and described the disease in so masterly a manner as only Rilliet and Barthez are able to do. And for the same reason I think it important to relate the following case of invagination of the colon descendens, with its peculiar complication with en-

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terorrhagia, in order to establish if possible the exact diagnosis of this dangerous disease by comparison.

CASE.—D. S., a robust and vigorous boy of seven and a half months, was always lively and healthy from his birth. The only trouble, for which now and then medical advice was procured, were slight broncho-catarrhs; and the only thing remarkable in the external appearance of the child (being apparently brisk and healthy) was an uncommon paleness of the skin. Being exclusively nourished by breastmilk, he never once suffered from disorders of digestion, not even at the time when the first two lower incisors made their appearance. No particular alteration in the state of his general health was perceived up to the 1st of March, 1857, on which day, towards evening, the child began to grow restless and troublesome, crying all night and seeming to be feverish. This symptom being the only one to be perceived, it was not much thought of, particularly when the child, towards morning of March 2d, fell asleep and rested for some hours. About 9 A. M., the same day, he had an evacuation of the usual quality, after which he again slept; three hours later, about noon, he had another evacuation, with much pressing and straining, no fæces coming from him, but only some serous fluid mixed with a little blood, of red color. This symptom causing some alarm, I was sent for, and found, at 2 o'clock P. M., the following *status præsens*: Last normal evacuation at 9 o'clock A. M., first bloody one at 12, second bloody one at 1 P. M., of just the same quality as the first, with only a sign of fæces. The child is pale, but not more so than usually; looks uneasy, without having a particularly timid or anxious expression; cries aloud, in a fierce and abrupt manner from time to time, as from colic; the temperature of the surface in general and of the head and extremities in particular, is normal. The abdomen is soft to the touch; there is nowhere a swelling to be felt; no pain effected by pressing; percussion yields the common tympanitic sound. Pulse 100, somewhat small, but rhythmic. The child has not taken any food for the last four or five hours and has not vomited. My diagnosis, after the foregoing symptoms and results of examination, being

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merely symptomatic, a dose of calomel was given; the prognosis being sufficiently favorable.

March 3, 9 o'clock, A. M.—The child is much changed for the worse; he is paler than ever, cheeks hollow, eyes sunk in the orbits; he looks timid, anxious, restless; cries often, but in a lower and more languid voice, and his extremities move in a much less violent manner than yesterday. Nevertheless, there is no change in the general appearance of the patient, skin and circumference of the extremities have not lost their former appearance, and the *embonpoint* does not seem to be diminished. Abdomen is soft to the touch, and without pain, when pressed, neither inflated, nor sunk. Only there is, in the left inguinal region, immediately above the S Romanum, a swelling offering some resistance to the finger of a longitudinal form, of about one and a half inches, and a lateral width of about one inch, which was not discovered there the preceding day. Nowhere in the colon could another pathological alteration be found, particularly not in the ileo-cæcal region. No fæces have been evacuated since yesterday, but there have been from twelve to fourteen passages, consisting each of a drachm or two of serous fluid, some three or four of them being colored with hæmatine; all of them being accompanied by painful straining and pressing. The child began last night to throw up everything he swallowed, pretty soon after having taken it, and continued vomiting, for ten or twelve times, through both the night and the following morning, bringing up nothing but some mucus and bile. Always, after the child threw up, or evacuated his bowels, he seemed more languid, anxious, and nervous, his nervousness increasing in proportion to his weakness. He does not seem to be very desirous of drinking. His tongue is moist, lightly covered with some white mucus. Pulse 120, very small, but rhythmical.

Diagnosis.—Invagination of the lower part of the colon descendens.—The treatment consisted in the immediate and repeated injection of warm water, in order to relieve, if possible, the obstruction of the intestine, by pressing the invaginated piece out of the lumen of the bowel. Every effort proved unsuccessful. The insuffla-

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tion of the bowels, for the same purpose, was resorted to, and continued for a long while, with no better success. Both the injected water and air returned from the rectum at the moment the injections were being made; the intestine filling with water on being inflated with air exactly as far up as to the place where the swelling could be felt in the left inguinal region. Only once did I believe that a small stream of air passed the invaginated bowel. It has been observed in many cases of invagination, that some gas escaped through the obstruction. I then left the child, who was to have a warm bath and some doses of Hydrarg, mur. and extr. hyosc.

4 o'clock, P. M.—There is no material change. The child looks, if possible, more anxious, with a particular expression of his features, sometimes of nervous excitement, sometimes of total depression; temperature of the head and extremities normal; thirst increasing, pulse 130, small, contracted but regular. Patient vomited frequently since the forenoon, from twelve to fifteen times, and had about the same number of evacuations, which were even less bloody than the preceding ones; almost wholly consisting of a serous fluid. I think the amount of blood excreted in all the passages for the last two days did not exceed one drachm. The same treatment as before was resorted to, but proved just as unsuccessful.

10 o'clock P. M.—I saw the patient, in consultation with Dr. H., who recommended ol. croc. in large doses, in order to have the obstruction removed at all events. Besides, injections of warm water and air were resorted to again and again, but all our efforts proved wholly ineffectual in overcoming the obstacle. The patient was in about the same condition he was in the afternoon, only more depressed in his strength, his motions being slower and sometimes as it were tired, and his voice sounding duller and lower than before. The eyes deeply sunk in the orbits; the cheeks hollow; pulse 136, smaller, but always regular. Vomiting occurred only four or five times since the afternoon; bowels evacuated about as many times a serous and mucous fluid, without blood. *Fecal matter* appeared in neither of them; *no sign of it was ever brought up by vomiting*; only

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once there was a slight tinge of greenish color in the passage, which I felt at first inclined to consider as produced by the repeated doses of Hydrargyrum.

March 4, 9 o'clock, A. M.—No more vomiting has occurred since last night, but the bowels excreted some five or six times the same serous fluid, which had, this time, the smell of bloodserum undergoing dissolution. The child is sinking rapidly (although the body does not lose very much), and is anxiously looking around for help; the pulse is becoming smaller and weaker, 140; thirst increasing. The general condition of the patient remained the same during the day, the treatment being, as above described, repeated several times without giving the least relief. *No more vomiting.*

March 5.—The last day did not bring any particular change in the course of the disease. *No vomiting occurred*, nor were evacuations of the bowels so frequent as on the previous days, nor was there blood contained in them. Hands, feet, legs, became cold, pulse 150, 160, small, contracted, at last scarcely to be felt. No loud crying was any more possible, only a whimpering heard from time to time. All the while the *abdomen was painless*, only very little tympanitic. The eyes were so sunk into the orbits and the cheeks had become so hollow that it would have been impossible to recognize the child. During all the periods of the disease, the little patient was *conscious of himself*, and an anxious observer of what was going on around him: looking around for help as if knowing that every one was engaged in trying to relieve him; sometimes depressed by his rapidly increasing weakness, sometimes disturbed by a sudden nervous excitement, sometimes troubled by the often repeated excretion of some drops of serous fluid from the bowels. Finally, conscious almost to the last quarter of an hour, the patient finished his four days' dying shortly before midnight.

Post-mortem examination, March 6, 10 o'clock A. M.—Only the examination of the abdomen was allowed. Rigor mortis. No unusual number of hypostatic spots on the back of the corpse. *A great difference is perceptible between the general appearance of the face and the other parts*

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of the body; the face being extremely thin, the eyes deeply sunk in the orbits, and the subcutaneous fat of the cheeks gone, the rest of the body pretty nearly retaining its usual and normal roundness and fullness. The abdomen is not very much inflated with gas; percussion yields a tympanitic sound; to the touch it is equally soft on all parts, only a slight swelling as described above among the symptoms of the disease, in the left inguinal region. After the integuments were opened, the following appearance presented itself: Stomach normal, without contents: the jejunum and ileum moderately inflated with gas, very few contents in them. The colon ascendens normal, the ileo-cæcal valve shows nothing particular. The flexion between colon transversum and descendens not so manifest as it ought to be, being more a spherical curvature than a right angle. In the lower part of the colon descendens just above the S Romanum, a piece of the intestine has dropped, or is introduced into the next lower one, constituting a simple invagination of the colon, which was probably prevented by the S Romanum from growing larger than it is found to be. As usual in such cases, there is no difficulty in removing the invagination and bringing the several parts into their normal proportion. On the upper flexion of the intestine, where the invagination is beginning, there is a manifest hyperæmia, on the lower flexion; inside the invagination, there is extravasation of blood between the membranes.

The colon transversum shows the following remarkable appearance: In its middle part, hanging down from the upper wall, there is a purely *fibrinous coagulation*, of a diameter of somewhat more than a third of an inch and two inches long *between the serous and the mucous membranes of the intestine*, the muscular tissue being wholly destroyed; the whole offering the clear signs of an extravasation having occurred long ago, of which nothing was left except the fibrine. Next to it there is *another fibrinous coagulum* of the same size and nature, with the exception, that it appears, from some pieces of coagulated blood being still attached to it, and from its not being so hard and dense, *somewhat less old than the former one*. Third, there

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is a coagulation, not fibrinous, but really bloody, of fresh appearance, but firm and dense. The mucous membrane, *which had been extended* by the two former hæmorrhages, of which the fibrinous coagulations have remained, has been *broken and lacerated by the third one*. The last coagulation *obstructs entirely the lumen of the colon*, its walls being extended by and closely adhering to the fibrinous and bloody contents. It is evident that the last extravasation was sufficient to shut the colon up, after it had become more and more narrow without injury to its functions, by its former local hæmorrhages.

The results of this post-mortem examination do not fully agree with those which Rilliet tells us are found in the majority of cases. In most of them the invagination was of a larger size, because in another part of the intestine. They mostly occurred in the colon descendens, and, there being no hindrance to their further development, enlarged to such a size as to implicate, sometimes, the whole colon between the ileo-cæcal valve and the S Romanum, in such a manner, that the flexures of the colon had wholly disappeared and the ileum seemed as it were to immerge directly in the rectum or the lower end of the *colon descendens*.

From this the positive statement of F. Rilliet (E. Barthez and F. Rilliet: *Manuel of the Diseases of Children*, vol. 1, chap. xiii., art. 1), that in no age whatever can an invagination occur without the lower end of the ileum being the guide of the invaginated bundle, is evidently not in conformity with the facts, and is a premature exaggeration.

The invaginated portion in the majority of Rilliet's cases had a dark red color, particularly the serous membrane; the mucous mebrane participating in the inflammation and congestion and covered with dark blood and mucus. In one case there was only a limited hyperæmia and extravasation, although fully corresponding with the small extent of the invagination, the enlargement of which was apparently kept back by the normal impediment given by the *flexura iliaca*. It is generally stated, that in many cases an invagination of even a considerable extent cannot be felt during life; so much the more remarkable is the

case above described, in which the anomaly, although small, was discernible by the touch soon after its occurrence.

A highly interesting feature in the whole number of facts resulting from the post-mortem examination, and not even thought of during the life of the patient, is the condition of the colon transversum. From the quality of the coagulations between the intestinal membranes, it is impossible to consider them as fresh productions; besides, no opening of a bloodvessel could be found, by which the hemorrhage could have taken place; weeks must have elapsed, since, *at different times, fibrinous coagulations were deposited.* The last hemorrhage was a fresh one, since it obstructed the whole lumen of the bowel and was able to lead, by itself alone, to death. It is not the least interesting fact, amongst all the foregoing ones, that the extravasated blood *coagulated so rapidly, as not to allow a drop or even the color of blood to escape into the intestine between the place of hemorrhage and the invagination*, not to speak of the small quantity of blood excreted by the passages, after the *invagination had occurred.*

As to the symptomatic importance of either the obstruction by hemorrhage and the occlusion by invagination, there can be no doubt, in my opinion. I do not hesitate to say, that the symptoms of either of these anomalies, during life, must and would have been the same, if only one of them had occurred; for the general effect of either of them, as well on the lumen and function of the intestine as on the whole system, must be equally destructive. Of some diagnostic importance is the fact, that, although the coagulations in the colon transversum were firm, solid, and as large as I have described, at all events a great deal larger and more solid than the invaginated part of the colon descendens, this one was soon discovered, while the former one could not be found, neither by repeated palpation nor percussion; this is a fact, which corresponds with Rilliet's remarks on the *difficulty of finding, sometimes, even large and solid invaginations in the living subject.* The question arises, which of the two, the invagination, or the obstruction of the colon by hemorrhage, occurred first. In my opinion there can be no absolute certainty about the

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answer; but the following remarks may, perhaps, be thought sufficient to elucidate the subject. It is a fact, that two local hemorrhages occurred a long time before the invagination took place, and on the same spot, where the third and last one was to occur later; I do not feel enabled to say, whether there was a local predisposition to hemorrhage in only one blood vessel, it being too large or too thin, or abnormal in some other way; or if there was a general disposition, in all the internal organs of the child, to hemorrhage, which resulted, perhaps, from a comparative hyperæmia of the abdominal organs, corresponding with the continual paleness of the child, while robust and healthy. A further fact is this, that the invagination occurred *below* the bloody obstruction of the intestine, and it is highly probable, that after the hemorrhage occurred, the muscular motion below it would have been, if not stopped entirely, at least diminished. If, on the contrary, the invagination had taken place above the hemorrhage, there would be more probability of the former having been produced by the increase of the anti-peristaltic movement of the intestine. As the facts are, I am rather disposed to say, that the *invagination was the primary abnormality*, and the cause of the small quantity of bloody discharge excreted through the anus; and that the hemorrhage to which a predisposition was clearly present and cannot be well denied, ensued as soon as a strong anti-peristaltic motion of the muscular tissue of the intestine set in. There are, then, two different causes of death, both almost equally dangerous; both likely, with the same symptoms in the living subject. Finally, I have no doubt, that had no invagination occurred, probably the third hemorrhage would have occurred a short time afterwards, and led to certain death, under the same or similar symptoms as the ones related.

As to the symptoms of the case reported, I have only a few remarks to make, as the symptomatology given by Rilliet is most complete and able. His description fully corresponds with what I had occasion to relate. The only facts which, in my case, seem to be worthy of particular attention are these: that, first, the thirst of the child, which

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has been said to be usually not extraordinary, kept increasing in proportion to the duration, and to the approximation of the fatal end of the disease; and second, that vomiting, never bringing up faecal matter, in opposition to what is always observed in cases of invagination in adults, stopped full two days before death, although the post-mortem examination did not give the least evidence of mortification, or even inflammation.

THE OXYSULPHURET OF ANTIMONY AS AN EXPECTORANT IN INFLAMMATORY DISEASES OF THE INFANTILE RESPIRATORY ORGANS

THE oxysulphuret of antimony, although mentioned by Basilius Valentinus in the fifteenth century, was made known for the first time in 1654 by Glauber, who prepared it while operating on the metallie antimony. Although generally well known from that time, there is scarcely another chemical preparation for which more different modes of preparation have been recommended, the chemical composition of which has been sought in more different ways, and the pharmaceutical and medical reports on which are more various and even contradictory. Now, it not being our intention to write a treatise on the chemical constituents of the oxysulphuret of antimony, we shall rest satisfied with merely laying before our readers what we sincerely believe to be the best method of preparing this remedy—one we have largely employed in our practice, and the results of which we are about to give to our professional brethren.

The sixth edition of the *Prussian Pharmacopœia* (1846) gives the following prescription for preparing the oxysulphuret of antimony: 3 pounds of common carbonate of soda are dissolved in an iron vessel in 15 pounds of water, and are well mixed with a pound of lime made half fluid by three pounds of water, with 2 pounds of the black sulphuret of antimony, and with 4 ounces of flowers of sulphur. This mixture is to be boiled for an hour and a half, the evaporating water being always compensated by filling up anew. The remainder is again boiled with 6 pounds of water, filtered and washed out with hot water. The fluid is made to crystallize. The crystals are washed

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out with distilled water which has been mixed with $\frac{1}{100}$ of potassa, and afterwards dried. One pound of them is dissolved in 5 pounds of water, the whole filtered and diluted again with 25 pounds of water. A mixture of $4\frac{1}{2}$ ounces of sulphuric acid and 8 pounds of water decanted after refrigeration is then added. The sediment is filtered, washed out with common water at first, and with distilled water afterwards; is then pressed out between blotting paper, dried in a dark place, in a temperature of 77° Fahr., reduced to powder, and kept in a dark, well-closed vessel.

We omit the description of any physical and chemical qualities of this preparation, but give the analysis of Berzelius and H. Rose, the best analytical authorities. Both of these declare it to consist of 2 atoms of antimony and 5 atoms of sulphur (SB^2S^5), or of 61.59 equivalents of antimony and 38.41 of sulphur. It has been called by Liebig the persulphide of antimony.

We have given in full the mode of preparing this drug, which we make use of in our practice, for obvious reasons. The principal objection to the oxysulphuret of antimony has always been that it was so extremely liable to decomposition as not to be administered with any degree of surety. It has been asserted that there is always oxide of antimony formed in what is presumed to be the genuine article, and undoubtedly it is very often found. Sulphur too is formed, even in the shape of sulphuric acid, from decomposition induced principally by the influence of air and light. As to the latter influences, and those of a similar kind, it is evident that it is not the fault of the chemical preparation, if the conditions necessary to its unaltered state are not given. Nitrate of silver in solution, Prussic acid, and many chemical substances require the greatest care in preserving them; nevertheless, no one ever ventured to object to their administration in medical practice. It is true that great care has to be taken in preparing our medicament; that it requires washing out finally in distilled water instead of common water; that it needs to be dried slowly at a certain temperature, and kept under peculiar external conditions; it is true, besides, that

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the many other ways of preparing it are unsafe and give rise to decomposition; but, after all, we see no reason to declare a substance to be subject to decomposition, if it can be proved that it is easily decomposed only when made by a wrong process and kept under unfavorable circumstances.

Another objection to the medical use of the oxysulphuret of antimony has been, that it is soluble in alkalies, and might undergo decomposition in the stomach when the secretions happened to be abnormally alkaline. It has been asserted that it is decomposed too by acids, however slight they be. Now, we are unable to see, if indeed decomposition would easily take place, why a medicament ought not to be given for such a reason. If the secretions of the stomach are too alkaline, make them less so; if acid drinks will decompose your medicine, do not administer them. There are a great many other medicines requiring the same and more precautions; it has never been urged as a reason against the medicinal use of the nitrate of silver, that its tendency to decompose, either by the secretions of the stomach or by ingested food, makes it unfit for internal administration.

The truth is, that the oxysulphuret of antimony has not been in general use for a long time; twenty-five or fifty years ago it was highly estimated, but the majority of writers at the present day appear to scarcely know of its existence. In order to show this, we will give some literary notices, particularly such as have been taken from authors on infantile diseases, it being our object to communicate a few observations on the mode of operation of the oxysulphuret in diseases of children, and to recommend it for further use. We will premise that we desire our readers to give their special attention to the dose of this remedy, it being our firm conviction, after a great number of observations, that the want of success often complained of in its administration, and the want of confidence in its power, is but the consequence of an entire mistake as to the amount to be given.

Behrends administered one grain every two hours in the second stage of pneumonia, when expectoration was defi-

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cient and strength was failing, in combination with camphor and benzoic acid. Jahn gave one grain three or four times a day, in pulmonary catarrh, with opium and camphor. Richter gave one grain twice a day, in acute catarrh of the stomach, with tartrate of potassa, and two grains twice a day, in chronic arthritis, together with calomel and aconite. Brera employed a fourth of a grain every three hours, in painful arthritic affections, with morphine. Lessing gave one grain and a half three or four times, in chronic pulmonary catarrh.

From these quotations it is evident that it was impossible from the manner of administering this remedy, in combination with others frequently of the same class, to decide on its effects; and further, that the dose seldom exceeded one grain, and only in exceptional cases reached as high as six or eight grains in the course of a day. It is, moreover, to be kept in mind, that such are the doses administered to adults.

In looking over the literature of diseases of children, we find as many negative as positive facts; that is to say, there are as many writers who do not even mention the name of this article, as there are who recommend it highly. In the oldest pædiatric literature, even in Nils Rosen von Rosenstein's work, the oxysulphuret of antimony is not mentioned. Jahn (1803) says it has been recommended by some in whooping cough.

Henke gave half a grain twice a day, together with half a grain of powdered herb of belladonna, in whooping cough. Tourtual gave a quarter of a grain, with three grains of sulphur, three times a day, in pseudo-croup, and the second stage of inflammation of the trachea. Dornblüth used a quarter of a grain every three hours, in pneumonia of children of one year of age. Wendt gave the same quantity, in the like disease, four times a day, to children of from three to four years of age. Hinze gave half a grain every two hours, with oxide of zinc and musk in whooping cough. Meikisch, who wrote his "Contributions to the Knowledge of the Infantile Organism" at about the same time (1825), neither recommends nor mentions it. Wenzel (1829) prescribed it in

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pneumonia, to a child of one year of age, a third of a grain to be taken three times a day; to a child of two years of age, either half a grain four times a day, or a quarter of a grain twice a day, or a sixth of a grain to be taken every hour; in measles, to a child of two years of age six doses of half a grain each, every two hours; to a child, one year old, twelve doses, of an eighth of a grain each, to be taken four times a day. Rau (1832) considers it to be a powerful expectorant, in a dose of a sixth or a quarter of a grain, in infantile pneumonia, after the height of inflammation and fever is over, and where the accumulation of phlegm in the bronchia forbids free breathing. Meissner (1832) mentions it as an expectorant, but does not appear to expect much of its administration. After this period, the oxysulphuret of antimony is seldom mentioned, and never so strongly recommended as before. It is true, that Cruse (1839) in his work on infantile bronchitis, speaks of it as an expectorant, but he frankly states that he prefers the anisated liquor of hartshorn.

Fuchs, in his monograph on infantile bronchitis (1849), merely mentions its name, but as early as 1837, Seifert did not think proper to name it among his medicinal agents, in his monograph on the broncho-pneumonia of newborn infants and nurslings. Moreover, there is perhaps no manual on infantile diseases, of the last twenty years or more, which takes the least notice of it, whereby sufficient proof is given that the recommendations of some of the earlier writers were not confirmed by the experience of their successors. In the manuals of the following authors: Valleix, Barrier, Underwood, Coley, Evanson and Maunsell, Stewart, Eberle, Legendre, Dewees, Hennig, Meigs, Condie, Churchill, Bednar, West, Rilliet and Barthez, Bouchut, and Tanner, not the slightest mention is made of the effect of the oxysulphuret of antimony as an expectorant.

In the works of some of the latest writers we find similar remarks. Anton, in his collection of prescriptions, employs in pneumonia of children of from eight to twelve years of age, a quarter or one-half of a grain. Joseph

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Schneller, in his "Materia Medica, Applied to the Diseases of the Infantile Age" (1857), while saying, that it is administered in long-continued catarrh, bronchial blennorrhœa, in croup, when the more dangerous symptoms are disappearing, in whooping cough, as a diaphoretic and expectorant, speaks of doses of an eighth or a quarter of a grain each, to be taken three or four times a day. The pharmaceutical writers of the present day offer similar remarks: Schroff, of Vienna, speaks of several daily doses of from a quarter of a grain to a grain each; Schuchardt, of Gottingen, has from a quarter of a grain to two grains, and allows even five grains in exceptional cases. Oesterlen, of Heidelberg, whose doses are believed in Germany to be generally very high, speaks of doses of from one to four grains, to be given several times a day. Sobernheim recommends a quarter or one-half of a grain, sometimes even one or two grains, to be administered two or four times a day. All these doses are considered to be normal doses for adults. While, then, authors on pharmaceutics and therapeutics deem it their duty to register anything that has been said on any pharmaceutical object, pathologists of the present day, especially such of the last year, as Wunderlich, Leubuscher, Niemeyer, either entirely overlook this antimonial remedy, or have very little indeed to say in its favor. Finally, from "Thompson's Conspectus of the British Pharmacopœias," seventeenth edition, 1852, we copy the following notes on the oxysulphuret of antimony: "Operation: emetic, diaphoretic, cathartic, according to the extent of the dose; alterative, used now only for forming Plummer's pill. Use: for chronic rheumatism and obstinate eruptions. Seldom ordered. Dose: gr. i. to iv. twice or thrice a day, in a pill." The "Dispensatory of the United States," eleventh edition, p. 929, pronounces the very same opinion: "The precipitated sulphuret of antimony is alterative, diaphoretic, and emetic. It is, however, an uncertain medicine, as well from the want of uniformity in its composition, as from its liability to vary in its action with the state of the stomach. It is seldom given alone, but generally in combination with calomel and

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guaiacum, in the form of Plummer's pills, as an alterative in secondary syphilis and cutaneous eruptions, or conjoined with henbane or hemlock in chronic rheumatism. During its use the patient should abstain from acidulous drinks. Its dose as an alterative, is from one to two grains twice a day, in the form of a pill; as an emetic, from five grains to a scruple."

From the facts thus selected from the authors of more than the last half century, it becomes evident that there is a great variety of opinions as to the operation of the oxysulphuret of antimony. While believed to be, at a certain period, a highly valuable remedy in different morbid conditions of the organism, or inflammations of the respiratory organs, scrofula, rheumatism, arthritis, blennorrhœa, diseases of the lymphatic glands, of the skin, of the pulmonary nerves, it has been again considered to be so valueless as not to attract the least attention from the medical writers of the last twenty years. We believe the reason may be found in the fact we insisted upon above, that the majority of preparations have been uncertain, because of their being badly made; and in the further fact, that medical practitioners followed more the theoretical impression of the caution required by antimonial medicaments in general, than their own careful observations on the mode and strength of the operation of the precipitated oxysulphuret.

Thus, what we are going to prove next is, that the doses given have been incompetent and insufficient for any considerable result: and that what is put down as the highest dose to be administered, is scarcely proper to begin with even in the slightest affections.

It is well understood by our readers that the larger doses of one grain, etc., as above-mentioned, are to be taken as the quantity allowed for adults. If these doses were to be reduced to the proportion necessary for infantile diseases, we shall, after having reported our practice and the results of our doses, appear more justified in saying that the difference of opinion and the want of confidence is entirely due to the insufficiency of the doses administered.

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Before making some general remarks on the indications, we annex the subjoined list of cases taken from the journal of the children's department of "the German Dis-

No. on Journal.	Sex.	Age.	Disease.	Dose of oxysulph. of antim.	Days Continued	Combined with
7	F.	YM	Pneumonia, left, inf.	1½ gr. ev. 2 h.	4	
9	M.	3	" " sup.	1 gr. 4 t. a dy.	12	
158	F.	9	" bilat. sup.	1 gr. ev. 2 h.		
216	F.	6	Hooping cough, cat.	¾ gr. 4 t. a dy.		Extr. bellad. ¼ gr.
265	M.	5	" " "	1½ gr. " "		" " "
281	F.	4	" " "	1½ gr. " "		" " "
290	M.	1 6	" " "	1½ gr. ev. 2 h.		" " "
				3 gr. 4 t. a dy.		
300	F.	9	" pneumonia.	2 gr. " "		Sulph. chin. ½ gr.
311	F.	3	Pneumonia, left, inf. after measles.	2½ gr. " "		Extr. bellad. ¼ gr.
313	F.	3	Hooping cough, cat.	1 gr. " "		Sulph. chin. ½ gr.
326	M.	2 6	Pneumonia.	2½ gr. " "		
355	M.	7	" left, sup.	2 gr. " "		
370	M.	1 5	Bronch. cat.	1 gr. ev. 3 h.		
397	M.	3	" " "	¼ gr. ev. 2 h.	4	Extr. bellad. 1/3 gr.
410	F.	2	Hooping cough, cat.	2 gr. 3 t. a dy.		
457	M.	1 8	Bronch. cat.	12/3 gr. ev. 2 h.	2	
486	M.	7	Hooping cough, cat.	1 gr. 4 t. a dy.	12	Extr. bellad. 1/6 gr.
541	F.	1 2	Bronch. and gastr. cat.	1 gr. ev. 3 h.	2	Sulph. chin. ½ gr.
610	M.	2 2	Bronch. cat., emphys.	2½ gr. 3 t. a dy.	6	
628	M.	4 6	Hooping cough, cat.	1½ gr. " "	8	Extr. bellad. 1/3 gr.
691	F.	6	" " "	1 gr. 4 t. a dy.	6	¼ gr.
709	F.	1 7	Bronch. cat.	1 gr. ev. 2 h.	12	
826	F.	7	" " "	1 gr. 4 t. a dy.		
981	M.	5	Hooping cough, cat.	¾ gr. " "		Extr. bellad. 1/6 gr.
1000	M.	1 1	Pneumonia, left, inf.	1 gr. ev. 3 h.		
1134	M.	7	Pneumonia, left, sup.	1 gr. ev. 2 h.	4	
1144	M.	2	Ditto, Hooping cough.	1 gr. " "	2	
				2 gr. " "	2	
				3 gr. 4 t. a dy.	8	Extr. bellad. ½ gr.
1160	M.	2	Bronchopneumonia.	2 gr. ev. 2 h.	6	
1168	M.	1 6	Pneumonia, h. cough.	2 gr. " "	4	
1172	M.	1 6	" right, middle	2 gr. " "	6	
1176	F.	3	Hoop. cough, br. cat.	1 gr. 3 t. a dy.		Extr. bellad. 1/6 gr.
1261	M.	1 1	Pneu. right, sup., tub.	1½ gr. ev. 2 h.	4	Sulph. chin. ¼ gr.
1370	F.	2	Pneumonia, left.	1 gr. " "		
1373	M.	1 6	Pneumonia, right, inf.	2 gr. " "		

pensary of the City of New York," which, for the use of our readers, has the number on the journal, the sex and age of the patient, the diagnosis, and the doses of the oxysulphuret of antimony; all the cases occurring in the

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first eight months of 1858. We shall add some observations to the above from our private practice.

Of this number two patients died; one of pneumonia combined with measles, the other of quite recent pneumonia of the inferior lobe of the left lung, for which she had not been under treatment, after her whooping cough subsided. All the others recovered.

The general result of the dispensary was also obtained in our private practice. We remember a great number of patients of a year and under, who took a grain of the oxysulphuret of antimony every two hours, even every hour, without vomiting more than once or twice, some without vomiting at all. The same occurred with children of two or three years of age, who took doses of two grains, four, and even six or eight times a day, without showing any other result than the desired one. We recollect the case of a boy of two years four months of age, in the basement of No. 158 Leonard Street, who while suffering from a severe double pleuro-pneumonia, after having for a while taken somewhat smaller doses, took for four days, either a dose of two and a half grains every hour, or of five grains every two hours; he did not vomit more than once, and that easily, in twenty-four hours, and did not show more than a trace of the doses in the passages, of which he had one daily, before the end of the second day. The pathological alteration of the lungs and pleura was such, that the prognosis was unfavorable from the beginning; but the purpose of the administration of large doses of the remedy was readily accomplished as the patient, in consequence of his easy and copious expectoration, avoided the death of suffocation.

A boy of six months of age has been under our care for the last week, who has taken, every other hour, a dose of a grain and a half, while in the second stage of pneumonia of the left lung. It is true that the infant vomited after the first four doses, but he did not feel the worse for it; only on the third day of his taking the remedy it would be found in the passages, which were not particularly changed from their general normal appearance. When, indeed, children are vomiting after the first, or

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one of the first, doses of the medicament, we do not see any harm in it; the bronchial secretions cannot be removed in a quicker and generally safer manner.

We omit giving further special reports on individual cases; the diseases we refer to are so common as to be the daily anxiety of every practitioner; and every one will be capable of proving the accuracy of our observations, and the truth of our remarks very speedily. After the favorable results above reported, by means of large doses of the oxysulphuret of antimony, we trust the profession will resort to larger doses, and thus again introduce into their practice a long-forgotten remedy.

But it cannot be too strenuously urged, that the indications for the use of this medicine in inflammatory diseases of the infantile respiratory organs, ought not to be overlooked. Whoever contends against the fever of the first onset of pneumonia with the oxysulphuret, will feel sadly disappointed as to the final result.

Whoever treats acute bronchitis in the same manner, will soon become aware of his mistake. Its operation is only to liquefy the secretion of the mucous membranes of the respiratory organs.

We think it may be well compared to the preparations of mercury; in the same manner as these effect the liquefaction of plastic exudations and alter the plastic quality of the blood, the oxysulphuret of antimony effects the liquefaction of the secretions of the mucous membranes of the respiratory organs. How this is done it is impossible to determine. At all events some effect on the respiratory nerves is also produced, and possibly much of the result is the consequence of their altered functions. How far, besides, the mucous membranes of other systems are subject to the operations of the medicine, our experience does not fully enable us to say.

It has been used, and is used by us, in inflammations of the larynx, trachea, bronchi, bronchia, and lungs. After the inflammatory fever is removed, and the disease has reached its highest development, it ought to be given alone, or in combination with other agents, in full doses. Not before this stage of the disease can this effect be

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obtained. We have generally been fortunate enough to see a speedy recovery follow its administration. We need not add, that it renders the best services in common bronchial catarrh, where full and speedy expectoration is wanted. Such were the indications for the use of the oxysulphuret of antimony at the time of its cautious administration, long before it appeared to be almost entirely forgotten, particularly in the United States and Great Britain. But the want of knowledge as to its proper use, seems to have impaired the success due to it when used right.

There is but one writer, Neumann (1840), who went as far as to prescribe to adult patients, doses of six or seven grains without producing vomiting, and to confess that he did not see an objection to giving, if necessary, a dose of twenty grains. To this remark, and to the fact, that this remedy has been recommended, and administered by us also, in a few large doses daily, in pulmonary emphysema, and, finally, to a remark in Rilliet and Barthez's Manual (vol. iii. chest, chap. viii., art. ix.) on the use of from five-sixths of a grain to thirteen grains, in some cases, of the mineral kermes, another, but not so safe a preparation of antimony, we owe the first idea of introducing into our practice the oxysulphuret in large doses. We had abandoned it years ago, tired and disappointed with the entire want of success in the use of the small doses taught by the manuals on materia medica.

We are aware of the objection to large doses of this remedy, that it cannot but sometimes produce excessive vomiting. Such a case might occur, but could easily be remedied by diminishing the dose; there is no remedy against which individual idiosyncrasies will not prove rebellious, although given in small doses.

Generally, vomiting will not prove of any importance; at least we have been taught so by experience. Furthermore, it is to be kept in mind that there are influences which may be avoided by careful management; it is well known, for instance, that nauseating remedies, although in small quantities, may operate as emetics; thus, a little tartar emetic will, when dissolved in a large quantity of water, prove to operate as an emetic and purgative. On

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this principle the oxysulphuret of antimony, too, could have a nauseating effect, when brought into further contact with the whole surface of the mucous membrane of the stomach; it is even possible, in our opinion, to produce diarrhœa by diluting the remedy by copious drinking of sugar-water, or similar things. All this will have to be avoided.

We are less afraid of diarrhœa being produced by spontaneous chemical decomposition, especially by formation of the oxide of antimony, for acids and alkalies can be avoided, and kept from coming into contact with the oxysulphuret, and diet may always be regulated according to circumstances. Further, we scarcely recollect a case where diarrhœa of any importance followed the administration of our medicament; at all events, there was none, the cause of which we could look for in the antimony. Third, our preparation, when found in the evacuations of the bowels, is not decomposed.

As to the fact, that the oxysulphuret of antimony is found in the passages a day or two, or three, after commencing its administration, we have had the objection made to our large doses, that they are worthless because of their leaving the organism without exercising any influence. Now we have often experienced the fact, that no difference can be found as to the time (usually the second or third day) when the medicament is visible in the fœces, whether it has been given in large or small doses. Besides, we do not know exactly what the mode of its operation is; perhaps it is not necessary at all to have it entirely dissolved and taken into the system in order to see its full power developed; and besides, we know very well that other remedies appear in the fœces very soon after their having been swallowed, and, like the iron in its several forms and combinations, lose nothing of their medicinal effect.

The last objection to the oxysulphuret of antimony has been, that it belongs to the class of nauseating remedies, and will, undoubtedly, when taken any length of time, affect the appetite of the patients, and thereby injure their strength. Now, we desire our readers to remember what the indications are which require its administration.

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An inflammatory fever has just been removed by an antiphlogistic treatment; the assimilating functions are almost entirely gone; there is still a fever, and the necessity, at the same time, of furthering the secretion of the mucous membrane and removing exudation. This is the period for the employment of this drug. The appetite cannot be affected by the medicament, for there is none; if there was, in spite of fever and inflammation, it would be better to impair it, in order to keep the digestive functions as inactive as possible. At a later period of the disease, or where danger arises from anæmia, it is certainly necessary to think of the stimulation of appetite, digestion, and assimilation. Then the oxysulphuret of antimony may be combined with iron, with quinine, with rhubarb, or nux vomica, etc., each of which has its own indication. One remedy cannot answer all indications.

We have a single additional remark to make. Our therapeutical observations have generally taught us, that wherever a remedy is really and fully indicated, it is tolerated in large doses. Thus, we have the firm conviction that the large doses of the oxysulphuret of antimony, recommended above, will surely be adopted in general practice, as has been the case with the tartar emetic since the times of Peschier and Rasori, and with the opium since the ingenious and important discoveries of Clark.



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THE diseases of the infantile liver have attracted very little attention from the majority of even eminent writers on infantile pathology. The symptomatology given in many books is quite obscure, the pathological anatomy seldom answers the description of the diseases, and even their denominations and classifications fail to give an idea of the cases to which they have been applied. Thus, the only notice on enlargement of the infantile liver contained in the excellent work of Drs. Rilliet and Barthez, besides an article on fatty degeneration of that organ, is found under the head of "*hepatitis or conjection.*" Under this name they describe an affection, said to be very rare in children, as they have seen but six cases altogether. It is reported to "commence by a slight febrile movement, accompanied by increased thirst and loss of appetite. At the same time, or shortly afterwards, an icteric tint is perceived, limited at first to the conjunctivæ, and slightly pronounced, but soon becoming very marked. The liver then augments in volume, passes the ribs, extends to the epigastrium, and ascending in the hypochondrium, increases the dullness of that region. The tumor is ordinarily indolent, easily circumscribed when the abdomen is soft and flexible, but is defined with difficulty when it is distended. At the same time that the jaundice and tumefaction of the liver are manifest, the urine becomes changed, and of the color of beer. The stools were few, liquid, and discolored. At the end of a variable time, the fever diminishes and disappears; thirst is no longer felt; the appetite is recovered. The tumor of the liver, which has progressively diminished, still continues; it, however, soon disappears. The icteric coloration is in part effaced. The urine recovers its normal color, and at the end of twenty or thirty days all the morbid symptoms have disappeared. The acute

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symptoms have usually disappeared some days before." Of Rilliet and Barthez's six patients, two were four years old, two five, one twelve, and one fourteen. Five recovered; one, a tuberculous child, died.

The description of the disease, as given by these celebrated authors, and the results of the single post-mortem examination, recorded in their well-known manual, and the almost perfect silence in medical literature on this and similar subjects will, perhaps, justify some clinical and anatomical remarks on what we understand by enlargement of the infantile liver; the more so, as we consider it of much more frequent occurrence in infantile life than has been supposed, and as, therefore, of great practical interest.

Enlargement of the liver must by no means be considered as a uniform condition of this organ. As the name applies to size only, the nature of the enlargement, the pathological alteration of the organic tissue will always be the important question. Thus, the liver is found enlarged in both acute and chronic hyperæmia, in true hypertrophy of the parenchyma, in exudation of coagulable matter into the tissue, in fatty and steatomatous degeneration of the substance. Of all these various conditions, the real hypertrophy of the liver ought to be taken as enlargement, in the strictest sense of the name. It is not a very frequent occurrence, taken in proportion to other affections, and is brought on, in the majority of cases, by mechanical hyperæmia of the hepatic tissue, produced by diseases of the lungs or heart. The size of the organ is increased in all its diameters, its consistency is greater, its color darker, and its substance hyperæmic; its texture exhibiting no alteration whatsoever, not even by the most scrutinizing microscopical inspection. Generally, cases of enlargement of the liver are the consequence of a hyperæmic condition, either acute or chronic, the latter being generally induced by diseases of the lungs or heart, prohibiting a full stream of blood entering the right heart from the inferior cava. Acute hyperæmia will rarely produce alteration of the hepatic structure; even chronic hyperæmia may exist for a while without giving rise to pathological degenerations. The amount of blood contained in

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the liver will be larger, the color darker and uniformly blackish red, and its diameters either moderately or considerably increased. Now, such cases of enlargement of the infantile liver as will not be connected with entire degeneration of the hepatic tissue (as fatty or steatomatous degeneration), being the direct consequences of a hyperæmic condition of the substance, will form the principal object of the next pages. The hyperæmia itself will be considered as the result of numerous affections of other organs, thus proving the intimate connection between the different parts of the organism.

It is a singular fact that the large glands of the human body in general, and the liver in particular, have required a long time to become known to physiologists, in their normal condition, even after pathologists had long undertaken to classify the abnormalities existing, or believed to exist, in both their size and structure. Enlargement of the liver was long spoken of as a common disease, before the normal size of the organ was enquired into. That such enquiries were more than merely interesting, is sufficiently proven now that even the exact measures and weights of the liver, as given by such an eminent pathologist as Frerichs,¹ cannot be deemed sufficient to cover all the wants. The proportion of the weight of the liver, and the body in general, is found, by Frerichs, to vary from 1:17, and 1:50, the average proportion, in middle age, being from 1:24 to 1:40. Where, then, does the size and weight cease to be normal, or begin to be enlarged?

The liver is largest, in proportion, during foetal life. After birth its growth does not keep pace with that of the body in general, although the opinion of Portal and Meckel, who stated the liver of a new-born infant to be absolutely 25 per cent. larger than that of a child of eight or nine months, has not been confirmed by recent examinations. In the new-born infants the liver extends in front of the then nearly vertical stomach, so far into the left hypochondrium as to touch the spleen, the left lobe being nearly as large as the right one. The diminution of the size of the liver takes place in this left lobe, in which, during

¹ *Klinik der Leberkrankheiten*, 1859.

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foetal life, the ramifications of the umbilical vein were spreading to such a degree, that, at the end of the first year, when the stomach has assumed its transverse position of later life, it is diminished in size by one-half. After this time the liver is steadily increasing in size and weight, but never in proportion to the increase of the body in general. Thus there is a material difference in the changes visible in the liver from those manifesting themselves in either thymus gland or heart. While the heart is keeping up with the increase of the body in equal proportion; and while the thymus will, after having grown slowly until puberty, soon afterwards commence an entirely retrograde development, ending in the total disappearance of the glandular mass, thus exhibiting an absolute diminution in size; the liver will, while increasing in absolute weight and size, not grow in relative proportion to the body.

The proportional weight of both liver and body has been found, by Frerichs, to be the following:

In a foetus of 5 months . . .	1:20.5
" 6 " . . .	1:26.1.
" 7 " . . .	1:17.
In a new-born infant . . .	1:28.57 and 1:24.1
In an infant some days old . . .	1:20.5
In a child of 8 days . . .	1:21.6
" 5 weeks . . .	1:21.66.
" 1½ years . . .	1:33.2.
" 5 " . . .	1:18.3.
" 11 " . . .	1:25.56.
In a man of 22 " . . .	1:40.3.

Thus it appears that the proportion of size and weight of the liver is very variable indeed. Variations, however, are not only seen in different individuals, but in the same individual also, without depriving the liver of its normal character. Amongst the most important causes bearing upon the variable volume of the liver, is the assimilation of the food, not only the hyperæmia of the digestive organs consequent on the act of digestion, but the copious deposition of granular and amorphous matter into the hepatic cells adding to the weight and size of the organ. This

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is as well proved, as, by Bidder's and Schmidt's experiments, abstinence is found to rapidly diminish the bulk of the liver. There are many factors put in action to regulate the afflux of blood to the liver. The contraction of the diaphragm, and abdominal muscles lessens the circumference of the abdominal cavity, and by compressing the portal vein push the blood contained therein into the open lumina of the hepatic vessels. In a similar manner the contraction of the muscular layer of the stomach and intestines operate in removing the blood from the smallest twigs of the portal vein to the vein itself. Finally, the blood is removed from the hepatic veins to the heart and lungs, by the constant aspiration produced by inhalation and contemporaneous expulsion of the blood from the heart into the arterial vessels, the compression, by the diaphragm, of the liver and portal vein coöperating to this effect, and further, by the contraction of the thick muscular layers of the hepatic veins. These very causes of the expulsion of the blood from the liver point to a very interesting fact. The muscular layer of the hepatic veins, as muscular fibre in general, being less powerful, and the expansion of the thorax less intense in infantile age than in adults, the blood may be expected to find its way less rapidly from the liver to the thoracic organs, and the liver in children will be more apt, than in any other age, to retain a large size. The contractility of the hepatic veins and arteries will, besides the development of the muscular layers, depend on a great number of influences, of which the degree of innervation, and disturbances of nutrition in the substance of the blood-vessels, stand foremost. Thus experiments show the liver to become hyperæmic by injuries to certain parts of the oblongated spine, electric irritation of the central end of the vagus nerve, after it has been cut, contusion of the head, poisoning by curare, cutting of the splanchnic nerves, and extirpation of the larger part of the ganglion cœliacum. How far all these influences affect children, and of what importance they will be found to be in liver complaints and other diseases of the infantile organism, remains to be seen.

From some preceding remarks, we learn the size and

weight of the normal liver in both the fœtus and newly-born to be extraordinary. The knowledge of fœtal circulation equally shows the fact that the liver is the principal seat of circulation. Thus it is by no means remarkable that the liver of new-born children should be found both large and hyperæmic, before the pulmonary circulation has been fairly instituted. This physiological condition, therefore, must not be mistaken for a pathological enlargement and hyperæmia, which may be found in this early age, and may even be congenital, as the result of morbid processes undergone during fœtal life. Infants born with this anomaly, will soon waste away and die with symptoms to be noted hereafter. But the causes of hyperæmia of the liver, after birth, are very various. It will always be observed, and will remain for all life, in cases where the umbilical vein remains open and connects with the epigastric veins. Difficult delivery, deficient dilatation of the pulmonary cells, refrigeration of the skin, any impediments to circulation, may produce hyperæmia of the liver, and one of its most common causes is the premature separation of the child from the placenta, before the pulsation of the funis has closed, or respiration has fairly commenced. The hyperæmia may become such as to burst the bloodvessels; we have observed a case of hæmatemesis in a new-born child who threw up from his stomach from four to five ounces of blood in the first day after birth, and hardly escaped death, from, as we thought, no other reason but the premature tying of the funis; the infant did well after the imminent danger was removed, and lived at least a year afterwards without any inconvenience. From what we have said on the physiological and pathological hyperæmia of the liver, a few more remarks will appear to be justified, as they are of much practical importance. It is a source of great inconvenience and even danger to the infant, to bear the least compression of the right epigastric region, and we believe it to be of the utmost importance to avoid and pressure on this part in dressing, carrying about, etc. We venture to say more; we never neglect, wherever the funis has an uncommonly great diameter, to carefully fasten it on the left side of the infantile

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abdomen, believing that any pressure, slight though it be, on the hyperæmic and enlarged liver of the newly-born, may be able to affect either this organ or circulation in general.

In the later periods of infantile life, hyperæmia and enlargement of the liver is brought on by the same causes as in adults; we, therefore, give a mere sketch of both the affections in other organs and the alterations of the liver, giving rise to hyperæmia. Among the former, there are to be counted all such diseases as will repel the blood destined to enter the heart and pulmonary circulation into the *venæ cavæ*. Stenosis of the left venous ostium, insufficiency of the bicuspid, and particularly of the tricuspid valves, and all the pulmonary affections impeding circulation within the pulmonary artery (emphysema, induration of the lungs, atelectasis, scoliosis, large pleuritic exudations) will repel the blood into, or retain it in the *venæ cavæ*, or stop the aspiration known to be the principal means of introducing the blood into the pulmonary circulation. In consequence of the accumulation of blood in the *vena cava* the hepatic veins will dilate and become hypertrophied, and the same effect will, consequently, be produced in the portal vein and all its roots. Prof. Frerichs has sometimes succeeded in finding albumen in the urine. At the same time the secretion of the liver is usually unaltered, up to a later period of the disease, when the nutrition of the hepatic cells begins to be disturbed and fatty depositions commence. Slight icterus, produced by infiltration and increased secretion of the mucous membrane of the biliary ducts, is sometimes observed even at an early period. The progress of the repulsion of the blood into the roots of the portal vein produces troubles of nutrition and function in stomach, intestines, spleen, and pancreas; the mucous membranes are of a dark red color and appear thickened, and extravasations are formed leading to either transformation into pigmentous matter or to erosions and ulcerations. At once the secretion of the stomach and intestines is sometimes increased and serous; and serum, too, is secreted from the peritoneum. This change does not take place, in an equal proportion, in all the parts where

the roots of the portal vein originate, but perhaps in consequence of unequal distribution, number, size and position of the bloodvessels, the stomach suffers most, the cœcum and especially the solitary glands come next, and the small intestines are least affected by the morbid process.

Among the principal symptoms in this state of things, there will be a feeling of heaviness and pressure in the epigastric region, slight icterus and gastric catarrh, and the volume of the liver will be shown to be increased by palpation and percussion. In cases of repulsion of the blood into the portal vein, there will always be digestive troubles, nausea, swelling of the hæmorrhoidal veins, either constipation or diarrhœa. The urine is dark, and sometimes contains albumen, and always the pigmentous matter of bile. At the same time the symptoms of the original pulmonary or heart disease are found, corroborating the diagnosis, aggravating the prognosis, and endangering a cure or rendering it totally impossible.

This secondary hyperæmia and enlargement of the liver is undoubtedly not of the same frequency in children as in adults, severe and tedious diseases of the heart and lungs with their consecutive effects on the circulation in the liver being less frequent in infantile life. But it will readily be perceived of what influence in producing liver complaint, atelectasis of the lungs will be in early age, and congenital diseases of the heart, during the whole dreary life of the innocents condemned to an early death by a dangerous deformity. At all events, the liver will more easily be troubled in the manner described, the younger the patient, the liver being most expansible in early age.

Other causes of hyperæmia of the liver, which are totally independent of repulsions of blood into the venous circulation of that organ, will be found sometimes in an atonic condition of the hepatic veins, etc., and in deficient energy of the heart; this being unable to propel the blood with satisfactory vigor into either of the two circulations. The most frequent cause, however, in children, is active congestion of the parenchyma of the liver, mostly depending on digestion. The liver is well known to increase in size

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during any regular and normal process of digestion, without giving rise to more than a passing and physiological afflux of blood. This physiological afflux is very apt to become pathological by the mucous membrane of the stomach being affected by irritants like alcohol, mustard, pepper, coffee, and such like, by the ingestion of a superabundance of food, or of bad food. The sensation of oppression, of uneasiness, even of severe pain is a common symptom in this condition. That the irritation of the mucous membrane of the stomach and intestines is very liable to extend to the mucous membrane of the biliary ducts, etc., is just as little doubtful, as the fact that such patients as suffer from any disease of the stomach, will always complain of some degenerations in the functions of their liver, and finally material degenerations. How the irritation of the mucous membrane of the stomach is transmitted to that of the liver, does not seem to be fully agreed upon. Thus Broussais seeks for an explanation in the contiguity of the mucous membranes; Beau in a direct effect on the blood of the portal vein produced by some irritant brought into the stomach, and some consider the same result to be produced by mere sympathetic irritation transmitted from the intestines to the liver.

Traumatic influences may cause hyperæmia in the liver as well in infants as in adults. Age would not modify their effects. No less is the infantile age exposed to the effects of high temperature and miasms; more so the latter than the former. There can be no doubt that miasmatic influences give rise to severer affections of the liver than high temperature alone, as it is proved by statistical facts that degenerations of the same kind and like severity are found in the Netherlands, as between the Zones; particularly abscesses in the parenchyma of the liver, though rare occurrences in other countries of moderate temperature, are not at all rarer in Holland than in hot climates. As to the influences of miasmatic effluvia on children, we have abundant reason to state that enlargement of the liver (as well as that of the spleen) is not so unfrequent an occurrence in the infantile age as most authors would make us believe. A boy of three and a half years of age, who

had passed all his life in the swamps of South Brooklyn, without ever having suffered from intermittent fever, came under our observation, with a liver extending from the third rib to the right spina ant. sup., and to the margin of the spleen. Other cases which we have had occasion to observe, impress us with the belief that considerable enlargements of the large abdominal glands will be often observed by practitioners in the fever districts of our country. Enlargement of the infantile liver is said to be connected with a great number of diseases. As to rhachitis, it is a fact that the circumference of the abdomen is increased and the region of the liver particularly prominent, but it is no less a fact that the configuration of the skeleton has a great influence in bringing on this anomaly. T. R. Smith says he has always found rhachitis and hypertrophy of the liver in the same individuals, and therefore goes as far as to identify these two abnormalities. Now, it will be easily understood that hypertrophy of the liver may, in itself, exercise such an influence on digestion and assimilation as to seriously injure the nutrition of the organism, and therefore to produce rhachitis in a number of cases; but at the same time it must be remembered, that in early infantile age digestion mainly depends on the functions of the stomach, and less on those of the liver than in adults. Thus it does not appear to be very probable that functional troubles depending on the hypertrophied liver will be, in all cases, of such an influence as to produce rhachitis. Both of these diseases may even be considered as co-ordinate consequences of some other primary trouble, as, for instance, Astley Cooper is well known to have sought for the cause of rhachitis in a diseased state of the mesenteric glands. Bouvier, finally, who has as much experience on rhachitis as any man living, denies having met with hypertrophy of the liver in the majority of cases of rhachitis under his observation, thus rendering the contemporaneous existence, to say nothing of the identity of hypertrophy of the infantile liver and rhachitis, even more than dubious.

In scoliosis the liver, while being diminished in size in the majority of cases, may be enlarged. But the configuration of the osseous system is such as to render an

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enlargement in any other direction except upwards, downwards, or to the left, utterly impossible. For both the anterior and posterior surfaces of the liver are exposed to a constant pressure from the curved spine and ribs, to such an extent as to show deep impressions on either side and even to totally alter the shape of the organ. Such is the case particularly in those numerous cases, in which the scoliosis is to the right side, and the right lobe of the liver principally suffering in both function and substance.

Whooping-cough, too, is reported to produce enlargement of the liver in children. At least Brigg states as a fact that he found this anomaly as well as fatty degeneration of the same organ in children affected with whooping-cough. There is no doubt that such cases are readily explained by the injury done to pulmonary circulation and the repulsion of the blood into the vv. cava and hepaticæ.

The influence of malaria on the size and functions of the large abdominal glands, liver, and spleen, is well known to every pathologist. Thus we need no further remarks on this subject. So great, indeed, is the power of malarious influences, that even the fœtus may be affected by the blood of the mother. Thus Hamon reports the case of a new-born infant, whose spleen was enlarged to an extraordinary extent. The mother had been suffering from malaria during her pregnancy, and was cured by the administration of quinia, but after her confinement.

The results derived from post-mortem examinations of cases of typhus in children differ very much indeed. The liver was, in the majority of cases, found to be normal, by Barrier; in many cases enlarged and either anæmic or hyperæmic, by Rilliet and Barthez; always large and hyperæmic, by Loeschner; sometimes enlarged, either anæmic or hyperæmic and softened, in new-born infants large and soft, and of a dirty brownish red color, by Bednar; and sometimes normal, sometimes enlarged, solid, and hyperæmic, by Friedleben. Friedrich observed the liver of children dying from typhus to be normal on the sixth day in one case, on the nineteenth day in one; pale and anæmic on the eighth day in two cases, on the fifteenth in one, on the eighteenth in two; in all these cases there was no com-

plication with pulmonary disease. The liver was found to be hyperæmic on the eighth and on the twenty-first day in cases complicated with pneumonia in its second stage; and enlarged, anæmic, and fatty on the thirty-eighth day. This was a case remarkable by the presence of well-developed intestinal ulcerations, which are very rare occurrences indeed in infantile typhus; at the same time the lungs were hyperæmic in their inferior lobes, and the thoracic cavity considerably compressed by meteoristic inflation of the abdomen. Whether it can be taken to illustrate our subject, remains an open question; it being not at all improbable that the fatty degeneration of the liver was of longer duration. The bile was sometimes thick, copious, and of a dark color, sometimes thin, and either yellowish or greenish. The explanation of all these differences and apparent contradictions would be impossible, but for the facts stated by Friedleben. His experience shows that the liver of children affected with typhus was enlarged in such cases only as were complicated with pneumonia. Thus we can no longer hesitate to take as granted, that the liver in uncomplicated infantile typhus is not enlarged.

Finally, laryngismus stridulus, or "crowing inspiration" of children, has been said not only to be connected with, but to depend on hypertrophy of the liver. Such, at least, is the strongly expressed opinion of an English surgeon, Hood. He is positively opposed to the opinion pronounced by Ley, that laryngismus is produced by the enlargement of bronchial glands pressing the superior laryngeal nerve and producing, by means of the recurrent nerve, reflected spasms of the glottis. He would scarcely allow some slight cases of laryngismus to be explained "by either troubles of the stomach, or dentition, or fright, or cold"; but generally, the only cause of laryngismus is found by him in hypertrophy of the liver, which is said to be produced "by mal-assimilation of the food, bad blood, and preternatural growth in this organ." And why does Mr. Hood believe "hypertrophy of the liver," which he tautologically says is produced "by a preternatural growth in this organ," to be the only cause of laryngismus stridulus?

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Why, because he found the liver enlarged; that is, according to him, prominent from under the ribs, in children who perished in an attack of laryngismus, and because he found nothing else, or because nothing else, at least, is stated to have been met with. Now, we know well that every continued or temporary retardation of, or impediment to pulmonary circulation may instantaneously give rise to a swelling of the liver, that even the dyspnœa of the moribund condition in common eases may suffice to increase the size of the liver by repelling the blood in its veins; thus it appears not at all astonishing that the liver should be found swelled in cases of death produced by spasm of the glottis, and further, that Mr. Hood should have mistaken the consequence of the last and fatal suffocative attack for the cause of the disease. We have every reason to expect such a mistake to be made by a writer who knows of no other means of diagnosing hypertrophy of the liver besides feeling it below the ribs, seeing the children gasp for breath on pressure on the liver, and lying on their back fully stretched.² This latter remark is not even true, for it will be readily observed that children affected with enlargement of the liver prefer the reverse position.

Quite a peculiar alteration, with increase of volume, is found in the liver of the newly-born affected with syphilis. It was first described by Dr. Gubler,³ of Paris, and in such a satisfactory manner, that even the last writers on infantile syphilis have nothing or little to add to his expositions. In cases where the liver is thoroughly affected with syphilis, its color is yellow and differing much from its normal condition. There is no longer a difference in the two substances; the yellow color is spread through the whole mass, and with difficulty only there will be discovered some layers of whitish transparent granulations, and solitary ramifications of blood-vessels deprived of their normal contents. The liver is considerably hypertrophied,

² See *The Successful Treatment of Scarlet Fever*; also, *Observations on the Pathology and Treatment of Crowing Inspiration in Infants*. By T. Hood, Surgeon. London, 1857, p. 199.

³ *Gaz. d. hôp*, 1848, Jan.—*Gaz. méd.* p. 262.—*Journ. f. Kind.* XIX. 171. 1852.

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globular, turgescient. Its elasticity is such, that a cuneiform piece taken from the sharp margin and squeezed between the fingers, will escape like the stone of a cherry and rebound from the ground. When incised it produces a cracking noise like an encephaloid tumor. It is so hard, that very thin and transparent slices may be cut from the mass. The hepatic tissue yields no blood on pressure, but an abundance of a clear slightly yellow serum, which will continue to be secreted even after the pressure has been interrupted; it coagulates like a solution of albumen. Sugar, which was so regularly found in the normal liver by Claude Bernard, was not discovered.

Injections of the hepatic structure thus degenerated demonstrate, that the blood-vessels in the indurated tissue are, in their majority, impermeable, that the large vessels are diminished in their capacity, and the capillaries entirely obliterated. Microscopical examination shows the cause of this anomaly, viz., the presence of a considerable quantity of fibro-plastic elements. Wherever the syphilitic disorganization is but partial, the cells of the hepatic parenchyma conserve all the characters of their normal condition, in the middle and in spite of these new formations. It is but natural that the deposition of a large amount of these fibro-plastic elements should be followed by increase of the volume of the liver, by compression and destruction of the original hepatic cells, by compression and obliteration of blood-vessels, and cessation of the secretion of bile. Such bile as has been found by Dr. Gubler, was of a pale yellow color and contained a great deal more mucus than real elements of bile.

The syphilitic induration of the liver may be fully developed as early as during intra-uterine life, as has been proved, from the case of a fœtus which died at the moment of birth, by Desruelles and Cazenare (Diday, *traité de la syphilis des nouveau-nés*, etc., 1854, p. 153). In many instances it exhibits a great similarity to the steatomatous degeneration of the liver so often found in rickety and tuberculous constitutions. The enlargement of the liver, however, consequent on this as well as the fatty degeneration of that organ, are so little in direct and immediate

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connection with hyperæmia and its next consequences, that we must abstain from taking further notice of them, as they do not belong to our special subject.

The diagnosis of the enlargement of the liver is not without severe difficulties, from several reasons. The amount of blood contained in the liver is very variable, as is above shown by the influences of either digestion or abstinence; thus the results of both palpation and percussion are not very reliable in some instances, and at all events the physical examination ought not to be made immediately after food has been taken. No less a difficulty is the shape of the liver, which may be affected with either congenital or acquired deformities (by means of stays, etc.). Further, the organ may be in an abnormal location; distension of the intestines with gas or fæces, emphysema of the lungs, empyema, pneumothorax, hydropericardium, ascites, ovarian tumors, even degenerations of the stomach, pancreas, and kidneys may give rise to dislocation. And it will be perceived at once, that in a large number of cases the exact measurement of the liver will be prevented by large degenerations in its immediate neighborhood. These points are almost of the like importance in children as in adults; it is, however, true that degenerations of the neighboring organs are not very frequent in infantile age, but the practitioner must be aware of their occasional occurrence. It is true, moreover, that the dullness yielded by percussion cannot well give rise to mistakes in infantile age as far as the repletion of the intestines, especially the transverse colon, with hard, dry, and solid fæces is concerned. Flatus may endanger the certainty of diagnosis; fæces will not, as they generally are in a half liquid, movable condition. Now all these circumstances go to show that percussion and palpation will not be reliable in every case, and yield the exact circumference of the liver, but they show likewise, that they may seldom, if ever, be resorted to with unsatisfactory results in infantile age.

The size and shape of the thorax will influence the location of the liver. It is shorter in females than in males, and proportionately shorter in infantile than in advanced age; therefore the liver will be found, by palpation and

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percussion, reaching below the ribs in women and children, which it does not in adult males. The size of the liver, as we have learned above, is proportionately large in children, the left lobe particularly largely developed in the first year of life. It is covered, on its upper margin, by the inferior parts of the lungs; and finally, it is pushed downwards and forwards, by contraction of the diaphragm, with each inspiration. All these circumstances will, like those enumerated above, require some attention and care in applying the principal means in our possession, to physically explore the size of an organ so important to the organism in both its health and disease.

Professor Frerichs has published the longitudinal measurements of the normal liver, taken in different regions, and different ages. The measures are taken on the sternum—sternal line, from the nipple vertically downwards—mamillary line, and in a vertical direction below the axillary fossa—axillary line. They are, in centimeters, the following:

	Axill. line.	Mammill. line.	Sternal line.
Under 2 years,	4.25	3.85	2.37
2—6 “	5.08	4.83	3.72
6—10 “	7.55	6.83	3.33
10—15 “	7.12	7.06	4.44
15—20 “	8.89	8.89	5.90
20—40 “	9.36	9.05	5.82
40—60 “	9.75	9.31	6.18
60—80 “	9.00	8.00	5.41

Inspection is useful to secure the diagnosis of enlargement of the liver as well as palpation and percussion. The epigastric region appears to be filled up; the parts below the xiphoid process are rather convex than concave. The navel is generally, but not always, situated below its usual place. The abdomen is extended, and wherever there are functional troubles about the portal vein, there is dilatation of the epigastric veins, which are prominently visible all through the abdominal integuments. The same observation is made when the circulation is suffering in the vena cava, but the differential diagnosis between the vena porta and vena cava is given by the condition of the cutaneous

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veins of the lower extremities; troubles in the cava swelling these as well as the epigastric veins.

The skin is of a dirty yellowish hue, the face appears puffy, especially round the eyes. Slight icterus is no rare occurrence. The children are restless, mostly in a pronate posture, or partly on their right side. Acute hyperæmia shows always want of appetite and indigestion, nausea and vomiting, and flatulence. The tongue is furred, yellow or yellowish green. The patients are either constipated or the evacuations are grass-green and have a bad odor. The urine is of a dark color. There is fever, thirst, peevishness, slight icterus, swelling and often pain on the right side, dyspnœa and sometimes a short interrupted cough, and the right cheek is sometimes of a dark red color. In the newly-born the evacuations are rare, not copious, somewhat thick and tough, and of a dark green color; sometimes a yellow liquid is thrown up from the stomach; the skin has a slightly yellow tint; sometimes the icteric color will spread over other parts also.

In cases of chronic hyperæmia part of the symptoms are not so characteristic. There is no fever, no pain, no dyspnœa, except some short and troublesome reathing after meals or exertion. Icterus is not so common, but the dirty-greenish, pale hue of the skin, and the almost œdematous puffiness round the eyes are seldom missed. Of particular interest, however, in children affected with chronic hyperæmia and enlargement of the liver are the symptoms belonging to the digestive organs. It has been stated above how the roots of the portal vein are affected in cases of hyperæmia of the liver produced by repulsions of the blood into the hepatic and portal veins. The stomach, or any of the organs in which the roots of the portal vein originate, may be affected. In cases where the hepatic secretion is not interrupted, nor diminished, the gastro-intestinal mucous membrane may, in consequence of capillary stagnation, simply secrete more mucus and mucous serum, and thereby effect diarrhœa. As this diarrhœa is the immediate consequence of some internal disorder which appears to become relieved by the over-secretion, as by a local derivation, it ought not to be stopped prematurely.

Thus the authors of olden times, who were better clinical observers than physiologists, were not at all wrong when asserting the danger of stopping what they called a "diarrhœa biliosa." Now, a mere over-secretion of the mucous membrane from gastro-intestinal catarrh would not be so injurious, if this was all; but erosions and hemorrhages are not at all very rare occurrences. In all these cases the appetite of the little patients is not at all affected; unless the mucous membrane of the stomach is suffering from the morbid over-secretion alluded to. The younger the children, the more their digestion depends on the regular and uninterrupted functions of the stomach, as their principal food, milk, does not require many changes to become chylous. Thus it is evident that a young child with a stomach disordered in the manner described, will suffer extremely from indigestion, want of appetite and general wasting. But whenever the mucous membrane of the stomach is not injured, the children take more than an ordinary amount of food; the appetite becomes voracious. The cause is simply this, that the stomach alone has the function of nourishing the whole organism; as not only the liver in its disordered state contributes but a part of its work of digestion, but the over-secretion of the intestinal mucous membrane renders an over-taxation of the stomach and an uncommon amount of digestible food necessary. The same observation is always made in cases of ulceration of the lower part of the intestines, in marasmus consequent upon degeneration of the mesenteric glands. In both the organism requires an exceedingly large amount of food; in the former the body is constantly exhausted by the copious secretion of the ulcerations, in the latter by the non-assimilation of the food digested by the stomach and the secretion of the liver. The quality of the *fæces* undergoes important changes only when the secretion of bile is diminished. In such cases they have a peculiar putrid smell, as digestion is but incomplete. Of their color in the new-born we have spoken; in younger children they are rarely characterized by the grayish-white, clay-color observed in the *fæces* of icteric adults; but children in more advanced age show this color occasionally.

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Another symptom of enlargement of the liver, exhibiting some similarity to the voracity above mentioned, has been described by Francis Battersby (*Observations on Enlargement of the Liver and Spleen, and on Pica in Children*, in *Dublin Quar. Jour.*, May, 1849). The symptoms he refers to, and which we remember to have found in one or two instances, is pica, "or an appetite for substances which are not food. It is known to affect pregnant women and chlorotic girls. Pica, in children, depends probably on an altered sensibility of the nerves, and acid state of the secretions of the stomach, owing to their being fed on depraved milk, or irregularly. As a general rule, this is one evidence of undue lactation, for of fourteen cases in which I noted it the average duration of suckling was twenty months; six of those cases were suckled two years and upwards; and one of them, weaned at one year, was continued at the breast for seven months, during the uterogestation of a succeeding child. I have remarked that these little children eat greedily of coals, cinders, ashes, lime off the walls, dirt, shoes, paper, and even their own ordure. Children affected with pica are very delicate and wasted, their complexion is sallow, anæmic and waxy, the abdomen enlarged, the bowels are generally too free; the stools are of all colors, green, yellow, black, or white."

Repulsion of the blood into, or retention in the hepatic and portal veins is not so frequently a cause of hyperæmia and enlargement of the liver, in infantile age, as the active congestion of that organ by irritants, and bad nutrition in general. This is the general, or almost general, cause of a disease which would be usually as easily avoided if sufficient care was taken, as it is insidious and obstinate when contracted. It is so frequent in children as to render the assumption probable, that it is produced as well by direct irritation of the blood of the portal vein, as by sympathetic irritation derived from the intestinal tract, and the contiguity of the mucous membranes of the intestinal canal and the biliary ducts, etc., of the liver.

Therapeutics are to be modified according to circumstances. New-born infants must be bathed regularly, dressed moderately warm and entirely loose; where the

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epigastric region is swelled, calomel ought to be given as a laxative. Calomel and rhubarb, with or without a light alkali, is indicated whenever the passages continue to be thick and dark green for a period of weeks. Children in more advanced age require the same caution as to dress, pure air, digestible but little animal food; rhubarb, *aloe*, with or without iron or resolvent tonics. Mercury must be positively avoided, wherever the slightest apprehension is had of cachectic disposition. In cases brought on by malaria, quinia will prove successful, but not before the hyperæmic condition is removed. Occasional emetics, and slight alkaline purgatives will do good. Scarcely any case of chronic hyperæmia and enlargement of the liver will recover and remain cured without a tonic after treatment with iron, iodide of iron, etc. Acute hyperæmia, generally produced by intestinal irritation, contraindicates any irritants, but indicates light alkalies, *ipecacuanha* in either small or full doses, and acids. Local bleeding is sometimes necessary in the commencement of the cure. Moderate diarrhœa must not be stopped at once. Evacuations ought to be effected by means of injections of saline solutions. Enlargement of the liver, after hyperæmia has disappeared entirely, and real hypertrophy require iodide of iron, milk diet, and stimulant foot-baths. Cases of hyperæmia and enlargement of the liver, consequent on diseases of the thoracic viscera require the cure of these latter diseases.

CONGENITAL SARCOMA OF THE TONGUE

THOMAS KENNEDY, 729 Second Avenue, was born on the 4th of January, 1869. He is of Irish parentage; his father and mother are in good health, as is also another child of theirs, aged three years. No constitutional disease, either hereditary or acquired, can be traced in either. There has been no tuberculosis, carcinosis, or syphilis.

A few hours after birth the mother noticed a swelling of the tongue, which, however, did not embarrass nursing to a great extent. Dr. Hadden, of 151 East Fifty-first Street, who was called in on the day following, found a swelling on the tongue, of hazel-nut size, half an inch back of its tip, and in the left half of the organ, near the median line, extending backwards to the neighborhood of the attachment of the tongue at the floor of the mouth. It was round, pretty solid, protruding superiorly and inferiorly, without variety of color or surface appearance. The doctor, not arriving at a diagnosis, deferred his opinion and advice, impressing on the minds of the parents the necessity of sending for further advice in case of an increase in size. There was very little change, if any, a fortnight afterwards, when the same advice was repeated. About the end of February the tumor had somewhat increased, and the mother was directed to present the baby at my office for a diagnosis. Instead of so doing, she carried the patient to a college clinic on the first of March, when there was but little change, with the exception of a slight increase superiorly, the general appearance and nature of the growth remaining the same as before. The medical gentleman who was in charge of the clinic "cut the skin and probed," but nothing but blood flowing from the wound was the result of his examination. Patient was therefore required to be presented again in a week, and was then declared by the same gentleman to be too young

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for having an operation performed. Within that week the tumor had commenced to grow considerably, and the mother, growing alarmed, had the patient examined a few days afterward at a city dispensary, where again she was told that the baby was too young to have anything done. Again Dr. Hadden was called in, about the 12th of March, and found the tumor increased meanwhile to the size of a hickory-nut. It had developed in every direction; had a granular appearance superiorly; had changed in color, which hitherto had been the normal color of the tongue, to a dark red, the tissue of the tongue apparently giving way to the new growth. The doctor again urged her coming to see me for the baby, the more so as nursing had been given up for some time already, and the infant found even spoon-feeding more and more difficult. Still she waited until the afternoon of March 24th, when the baby was exhibited to Dr. Hadden and myself, with the following *status præsens*:

Baby two months and twenty days old, of average size; a little paler than he ought to be, but without a sickly expression of the face; skin clean and clear; no eczema, only a little seborrhœa on the scalp; secretions and excretions normal; sleep is reported fair; deglutition difficult. No swelling of the lymphatic glands; voice not changed. No sores, and no muguet. The mouth fairly open, giving a partial view of the tumor. The tumor, on forcing the mouth wide open, was found of walnut size, well rounded inferiorly, encroaching considerably on the floor of the mouth, so that the whole mass was turned up. The larger portion was situated in the median line of the tongue, and to the left of it, so much so that no portion of that side of the margin of the tongue could be recognized as independent of the tumor. The right margin of the tongue was still recognizable along part of the tumor, which besides, on this side, had pressed the tongue substance upwards and outwards, with the effect of presenting a short and sharp edge, appearing like an additional margin of the tongue, as if two tongues—a larger one inferiorly, and a smaller one superiorly—were joined to each other. The upper surface was not so uniformly rounded as the lower,

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inasmuch as a smooth groove or impression appeared to disjoint the whole mass, which felt pretty hard to the touch, somewhat elastic though, and was almost over its whole surface of a high red color, with a distinct net of copious and large capillaries. This surface was interrupted, in a diameter of about 4 or 5 lines, by a spherical ulceration, deeper in its centre than at its margin, and of grayish color. The whole mass, tongue and tumor, could be caught hold of and pulled forward to a certain extent, at all events sufficiently to insure a certain facility of applying a wire round the whole growth. Therefore the removal of the tumor was at once resolved upon, and the operation performed at 1 P. M. the following day, March 25th, at my office, in the presence of Drs. Hadden, Krackowizer, Sands, Althof, F. Simrock, Erskine Mason, Noeggerath, Knapp, Guleke, and several other medical gentlemen.

The patient was put under the influence of chloroform; a silk ligature was drawn through the tongue posteriorly and laterally to the tumor, so as not to interfere with the latter, or its removal; the platina wire of Stoechrer's galvano-caustic battery applied; the lower gums protected with a wet rag; tumor within the loop allowed to slip back into the cavity of the mouth, to protect the gums from the cautery, and the whole mass removed in a few seconds. A few drops of blood escaped from part of the stump, but a short application of the galvanic cautery stopped the oozing at once. Enough attachment to the floor of the mouth was left to secure the possibility of easy access, in case of necessity; but still it was thought proper to leave the silk ligature behind. The cut was clear, as if made with a knife; no hemorrhage; the scurf evidently but very thin. The patient recovered speedily from the effect of the anæsthetic, under whose effect he had been but a few minutes altogether, and drank water greedily; was taken home; fed regularly; had no fever; slept well; was quite well on March 26th, when I saw him at his residence; was carried to my office, a distance of a mile, on March 27th; had the silk ligature removed by Dr. Hadden on the 29th; exhibited a good and copious granulation on

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the wound, and was removed to Brooklyn, E. D., Long Island, where the family have gone to reside, on April 3d, and was presented again, April 9th, in my office. The wound is nearly healed; the centre portion still granulating; the anterior portion of the tongue of normal consistency. Baby has taken the breast again, in fact lives on nursing only; has gained flesh, and looks well.

The microscopical examination of the specimen, in its fresh state, was made by Dr. Knapp; when hardened in bichromate of potassa gr. ii., sulphate of soda gr. j., and water f. $\frac{3}{4}$ j. (Müller's fluid), by Dr. Simrock and myself. On incising the tumor from its anterior portion backwards, a small cyst, of a diameter of about two lines, was opened, but its contents lost for examination. The tumor itself offers a uniform composition, with the exogesion of the parts adjoining the healthy structure. These external portions contain a great deal of muscular tissue, interstitial tissue, and capillaries, and less in proportion of the constituents of the growth proper. The greater the distance from the surface or neighborhood, the more pronounced is the cell character of the tumor. The cells are mostly spindle-shaped, with one (rarely more) oviform, oblong nucleus, and one or more nucleoli; all of them of almost uniform size and shape. Large portions of the tumor are composed of nothing but these cells, which, in other places, will give way to similarly constituted round cells, interspersed with very few capillaries, but little interstitial connective tissue. This connective tissue is nowhere, as in cancer, congregated into alveolar structures; for whatever at a first glance might convey the impression of such is easily recognized as capillaries stretching over and through the cellular constituents.

Thus the tumor ranges with what Bennett called fibro-nucleated cancrioid, Paget classed under his recurrent fibroid, and Rokitsansky next to his carcinoma fasciculatum. I should call it, with Virchow, sarcoma fusocellulare.

The prognosis is doubtful. The general experience in such tumors is this: that in childhood, especially about the time of the second dentition, sarcoma is apt to occur on the jaws; that it is liable to return on the same spot, or in

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distant organs (pleura, lungs, etc.), in a softer and more carcinomatous form, but, however, in the average cases, fifty per cent. will escape such a return. As most of our malignant tumors are not the result of a diathesis, but, on the contrary, the diathesis is the result of a local affection, the sooner the local affection is removed the greater is the protection in the future. In this case, as there was no hereditary tendency in the family, no diathetic disposition; as, further, the general condition of the infant was a good one; as, finally, the neighboring lymphatic glands of the neck (which are so commonly affected even in the slightest catarrhal changes inside the mouth) were not altered in the least, I have some confidence in believing in a perfect cure.

At all events, even before its complete success can be reported, I have not hesitated to relate the case thus fully, because I have never heard nor read of another instance of congenital sarcoma of the tongue. I have studied the literature, as far as accessible to me, throughout, without finding its mate.

ANTHROPOLOGICAL AND PATHOLOGICAL SKETCHES ON THE INFANTILE BRAIN

IN the brain of the new-born there is very little difference between the gray and white substances; there is none in the embryo, but it grows more distinct with increasing age and development. One of the characteristic qualities of the embryonic and infantile brain is its large percentage of water. The soft mass forming the centre of the large hemisphere, before it develops into genuine white substance, contains an average percentage of water, of 89.93 (min. 85, max. 92.59); corpora striata contain 87.39 per cent. (min. 82.92, max. 91.88); the convolutions of the hemispheres, 87.76 (min. 82.85, max. 90.90); cerebellum, 80.74; pons, 86.77 (min. 81.81, max. 90); medulla oblongata, 84.38 (min. 80.76, max. 88.88). From these investigations of Dr. Weisbach's (*Medic. Jahrb.*, vol. xvi., No. 4) it is evident that the amount of water of the several parts of the brain of the new-born is largest in the white substance of the hemispheres, less in the convolutions of the surface, still less in the cerebellum and pons, and least in the oblongated spine. The comparison of these data with the corresponding facts taken from the brains of adults exhibits remarkable peculiarities, inasmuch as in adults the corpora striata contain more, and the white substance of the hemispheres less than any other part of the brain; and as, further, the oblongated spine contains more water than the pons Varolii. Every single part of the infantile brain is moister than the corresponding organ in the adult; only the senile period yields results approximating those of the young (Schlossberger in *Liebig's Annalen*, vol. 86, p. 119). Moreover, the separate parts of the infantile brain show more uniformity, as far as their percentages of water are concerned, than those of adults, which exhibit a greater variance. The percentage of water

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appears to diminish in quantity until the age of puberty, after which the changes are less marked; old age, again, exhibits a larger percentage.

Nor are these all the physical characteristics of brain substance in early age. Von Bibra and Schlossberger have found the amount of substances soluble in ether (fat, and fatty substances containing phosphorus, and extractive material) to be much smaller in the embryo than in the new-born, and less in the new-born than at an advanced age. They increase at a rapid pace in the child. In the embryo, further, there is, in the amount of material soluble in ether, no difference as to the gray and white substances; while in the advanced brain the amount of fat and phosphorus is principally deposited in the white substance of the large hemispheres. Just the reverse takes place in the embryo and the new-born; for the oblongated spine, being the principal physiological nervous centre at this stage of development, yields the largest amount of both fat and phosphorus.

Another series of chemical investigations throws considerable light on the proportions of water and such materials as are soluble in ether in the other animals. The percentage of water increases with the lower order of the vertebrates; the amount contained in the brain of lower mammalia corresponds with the undeveloped (fœtal) cerebral substance of the higher mammalia and man. The substances soluble in ether vary, both in mammalia and man, according to the different parts of the brain. In both, the gray substance contains less of them than the white one; and in both they are found in exactly the inverse ratio of the percentage of water. And, like the undeveloped organ of the human embryo and new-born, the oblongated spine contains least water, and most ethereal extracts (Gorup Besaney, *Manual of Physiological Chemistry*, p. 644).¹ Thus, if we were to point out the chemical characteristics of the undeveloped brain, as shown by the above facts concerning the animal,

¹ We add as a remarkable and suggestive fact the results of Bibra's experiments, which show that the weight and the relative constituents of the brain are but little influenced by starvation. Therefore, in processes deteriorating the anatomy

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the human embryo, and the new-born, we should look for them in the uniform development and appearance of all the different parts, in the absence of striking differences between gray and white substances, in the large amount of water, the small quantity of ethereal extracts, and the inverse ratio of the last-mentioned constituents to what is known as their due proportion in later life.

The head of the new-born is very large in proportion to the rest of the body, its height being one-fourth the whole length of the body, and its weight one-fifth, notwithstanding the bones being thin and light. It is round, its greatest width being between the two protuberances of the parietal bones. The skull predominates over the face. Forehead is also round, prominent in its middle portion; occiput is spherical; occipital bones more horizontal because of the base of the cranium being short. The bones are thin, not connected with each other except by flexible, expansible, and compressible fibrous bands, their several layers very indistinctly developed,—so little, indeed, that hemorrhages may easily take place between pericranium and the succulent bone; they are bluish, hyperæmic, and have two parallel sides without the impression, elevations, and general unevenness of advanced age; and the points of insertion of the muscles, and the arches of the eyebrows, are but slightly developed. The membranes of the brain are thin, hyperæmic, transparent, firmly attached to the bones, and contain a great deal of cerebro-spinal liquor.

The cranial cavity is one-fourth or one-third that of the adult, and measures 482 cubic centimeters. The occipital portion of this space amounts to 5, the parietal to 81.11, and the frontal to 13.89 per cent.

The brain, with its gray and white substances not very distinctly marked or separated, is soft, gelatinous, and of reddish-gray color. Only the oblongated spine, pons, corpora quadrigemina, and thalami are harder and firmer. The convolutions are large, few and flat. The lateral ventricles and physiology of the rest of the body, the anatomical condition and physiological function of the brain need not be disturbed to any great extent. Thus, the relative integrity of the action of the brain in many wasting diseases is easily explained.

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are smooth, and contain but little fluid. The hemispheres have not yet acquired their fibrous appearance. The anterior portion of the head is narrow and low; the anterior lobe of the large hemispheres weighing 60-67 grammes, or one-fifth that of the adult, which weighs as much as 300 grammes. The lateral lobe is large, and weighs 250 grammes; that is, one-fourth that of the adult, whose weight is 1000. The cerebellum is very small indeed, weighing but 25 grammes to 180-193 of the adult, or 6-7 per cent. of the whole brain. The hemispheres weigh 300 grammes, being 93 or 94 per cent. of the weight of the whole brain, and one-fourth or one-fifth of the weight of the adult hemispheres.²

These facts and figures are proofs and illustrations of several conclusions. There is nothing characteristic, nothing decisive in the skull or brain of the new-born. Everything is round, curved, smooth, loose, soft, indistinct. Little intellect, because little gray substance, and but few and flat convolutions. Little motory power, because of the smallness of the cerebellum. No distinct mark between the white and gray substances, therefore the irregular action of, and no just balance between, the conducting wires and the telegraphic directing centre, and therefore a disposition to abnormal action, viz., convulsions. Small and soft hemispheres, or rather gray substance; and therefore not only little intellect, but frequent and rapid loss of consciousness.

At the same time the size and weight of the nerves spreading through the body from the centres are considerable, the spine in about the same condition as the brain, with little distinction between the gray and white tissues, with the same looseness and softness and humidity, and the same tendency to abnormal action.

The proportions of the single parts of the brain undergo speedy changes. Its growth is intense. The cavity of the skull in the new-born, measuring one-third that of the adult, 482 cubic c. m., is twice as large (999) in the second year as originally; but its growth is not uniform. The posterior

² E. Huschke: "Skull, Brain, and Mind of Man and Animal, according to Age and Race." Jena, 1854, fol.

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occipital cavity, measuring 5 per cent. of the whole cranial cavity in the new-born, is 5.5 in the second year; the lateral middle portion diminishes by 1.10 p. c., and the anterior grows from 13.29 to 14.4 p. c. within the same period. *No part of the brain grows faster than the cerebellum*, it being in the new-born 6-7 p. c. of the whole weight of the brain, while the weight of the adult cerebellum is 12-14 p. c. Its growth is so rapid that the 6 or 7 p. c. grow so fast as to become 9 or 11 within two months; while with 10 or 15 years it yields only 12 and 13, and in the adult only 12 or 14. At the same time the whole brain is growing, but mostly posteriorly; thus the formerly horizontal and round posterior portion is flatter and more perpendicular; and the face grows considerably, particularly in its posterior portion.

Thus this period, the second year, is characterized by an inconsiderable diminution of the middle portion, and an equally small increase in size of the anterior portion of the brain, and further by a rapid increase of the cerebellum in size. The physiological action of the organ goes hand in hand with its progressing development, as every nerve function depends on nerve substance or nerve growth. Thus we understand why children can afford to be always in motion; to constantly exercise their muscles; to keep talking, laughing, crying, smiling, kicking, jumping, and fighting, all day; and to commence the same hard work again, after a sound sleep, with so little apparent tear and wear, for weeks and months and years (until the preponderance of the anterior portion of the brain, the large hemispheres, is established), as to put in the shade all the muscular feats of all the John Heenans.

This preponderance of the large hemispheres, particularly of the anterior lobes, is established, or rather commenced, at a later period. After the fifth or tenth year, the base of the skull grows more in an anterior direction. With the enlargement of the anterior part of the cranium and brain, while the parietal bones have nearly completed their development, the frontal bone is drawn forward in its lower part, while its upper is yet growing. Thus, while the posterior portion of the skull has become more per-

pendicular, the frontal portion, although appearing flatter, gives the anterior lobes of the hemispheres more room to develop themselves to the full capacity of the cranial cavity. Thus, while under usual circumstances the brain shapes the skull, the skull shapes and forms the brain. This, then, is the period when the middle portion of the brain is developing but slowly, the cerebellum has ceased its rapid development, and the really super-brutal, human, thinking portion of the brain commences to develop in long strides, viz., between the 5th and 10th years of life.

Thus this is the time when playing and fighting may still be the order of hours, but no longer of the day, as the cerebellum is still under the influence of its hitherto rapid development. At this period the median portion of the brain, and the white substance generally, although not receiving a large addition to its weight, is still predominant. At this time a child must be taught; at this time the receptive, remembering white substance of the large hemispheres has just been completed, is in full readiness for its functions, and is indeed the most active and reliable portion of the brain. This is the period of learning by heart, as memory is the principal quality of the brain, resp. mind. But nothing would be more injudicious than to exercise the white substance of the brain only. For the gray substance of the brain is being developed very fast, and in that period in which it is most pliable, most easily influenced, and amenable to culture. The time of a tree's growing is the time to shape it; the period of an organ's development is the best period for its training. A young lingual muscle will be practised into the intricate contortions of a foreign language; no adult will overcome them. And a young brain will be educated and trained into many functions, through its rapid anatomical changes and just forming structure, that an already fully-moulded organ will refuse to perform. The boy is not yet a philosopher, is not particularly adapted to reflection and thinking; but what little reflection exists, and whatever ideas rest undeveloped, because his gray cerebral substance has not been stirred into development by external influences, must be worked upon and exercised. Nothing, therefore,

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is more injudicious than to feed the memory of school-children exclusively; nothing more injurious than the mechanical learning by heart; no school-books less adapted to mental development than those question and answer apparatuses, catechisms, etc., so uniformly and pertinaciously used in our schools. Judgment and reflection are just ready to be developed by nature; we have simply to follow nature in her exertions, and fall into line for the same aim. Nature gave us contractile muscles adapted for every effort and exertion; if we neglect them they will become weak, and thin, and paralyzed. Nature is just raising gray substance in the cranial cavity of your boy; unless you induce, as you would in a muscle, a lively and vigorous circulation, and increase the physiological change of substance in it; he will grow thin, and emaciate, and paralytic.

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THE specimens I present¹ are designed to show different degrees of osseous development.

The first cranium presented here, is that of a fœtus born at full term. Both the bones and their sutures are normally developed, and within the cavity, unless there be disease of its contents, circulation, growth, and functions must necessarily become quite regular.

The second specimen is a cranium in which the same normal development of osseous tissue has taken place, but only to a limited degree. The peculiar sloping off of the margins, and the manner in which the sutural substance appears to overreach its normal outlines—further, the thinness and transparency of the bones, seem to show that but an insufficient amount of osseous material has been deposited. Thus, if we are to compare this specimen with the first, we have to speak of a *minus* of normal osseous development, and nothing else.

The third specimen here shown, is one which I claim as a *plus* of osseous development—not that there is any change in the condition of the osseous structure as such, but bone tissue has been developed in large quantities at an unusually early period.

While in the specimen just before shown the result must be a looseness, a flabbiness, of the cranial bones and integuments, and a relative instability of the contents, this last skull would exhibit a greater solidity, firmness, and stability of the bones and their coverings, and the effect upon the contents would be just the reverse of that we should have seen in the other.

The brain contained in a cranium which undergoes too early ossification will miss the necessary space for its development. It is not necessary here to recall the fact, that in the first year or two of life there is not a single

¹ The paper was accompanied with specimens and diagrams.

organ of the infantile system which develops with greater relative rapidity than just the brain. Thus it happens that when the cranium is ossified too early, the brain, although in itself normally developed, will be compressed; and, though the cranium be in other respects perfectly normal, this too early ossification alone may give rise to idiocy, to epilepsy, and so on. According to whether the early ossification has taken place uniformly throughout the cranial bones, or irregularly, it will give rise to a number of different shapes, which, in the scientific nomenclature of modern systems of anatomy, have been designated by as many different names.

The fourth specimen I present is one in which there is not a plus or minus of normal osseous development, but a pathological condition. That I may make myself perfectly intelligible, I ask you to follow me through a few remarks.

The growth of osseous tissue takes place from two different sources, either from the junction between epiphysis and diaphysis, or from under the periosteum. In the normal bone the medullary canals progress in a uniform manner upwards to the epiphysis, in the direction of the cartilage, every medullary space remaining the centre of a territory of cartilage, in such wise that the medullary spaces appear to have the function of vessels; for the cartilage is at too great a distance from the blood-vessels of the bones to be fed by their circulation.

The deposit of lime in the soft connective tissue of the bone is the result of the slowness of circulation. There are no lymphatic vessels, and very few blood-vessels in the bone; hence the circulation is rendered slow, and sometimes even stagnant. Lime is contained in the blood, combined with a large amount of carbonic acid. In all those tissues in which the circulation is very rapid the carbonic acid will not be disengaged from its lime; but where the circulation becomes stagnant or interrupted, a portion of the carbonic acid will, in consequence of its diffusibility, get so disengaged, and the lime will be deposited. Thus we find lime deposited in a number of inflammatory stagnations. It is deposited in the interver-

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tebral substance, in consequence of chronic inflammation of the vertebræ; in the costal cartilages of old people; in the larynx and trachea of patients who have long suffered from chronic catarrh; in the placenta of women who are suffering from chronic metritis, etc. It will be deposited less abundantly than in the normal osseous tissue, with its scanty supply of blood-vessels, in the copious and succulent new-formed connective tissue which is peculiar to the rhachitic process, and this, no matter whether the deposition be going on below the epiphysis or below the periosteum.

The new-formed, copious connective tissue of the rhachitic process remains a long time in its original condition; therefore we find a number of changes in the osseous system as the result of rhachitis. I will name a few of the principal ones:

1. *Infraction* is the effect of the bones getting thinner, inasmuch as absorption goes on regularly from the inside, while new normal bone is not formed on the outside. To what extent, in such a case, the compression, and, perhaps, laceration of the inclosed medullary substance may influence the general system, is a question which has not yet been studied. It is not, perhaps, impossible that, from the connection which has been found between the cells of the medulla and the lymphoid corpuscles, such an infraction of a rhachitical bone may have a great influence upon the organism.

2. *Tumefaction* of the cartilaginous layer between the epiphyses and diaphyses, and rhachitical swelling of the costal cartilages at their junction with the bones.

3. *Pectus Carinatum*, in consequence of the sternal ends of the ribs being drawn inward by inspiration, the sternum being pressed outward, and the cartilages being bent at a right angle.

4. *A peculiar groove* around the ribs caused by the traction of the diaphragm.

5. *Mobility of the Sacro-iliac Synchrondroses*. The weight of the body will push the promontory downwards, and give the pelvis a compressed, kidney-form shape.

6. *Curvatures of the long bones*, resulting from their softening, from their direct increase in size, and from

periosteal growth. When the rhachitical softening of the long bones takes place in early infancy, the curvature will be found, as a rule, in the direction of action of the flexors, these being at that period of life more powerful than the extensors. Thus in such cases we find a curvature outwards of both the forearms and the legs. Now and then we see a curvature in the opposite direction, but usually only in those cases in which the deformity took its origin at a period of life when the child was already walking. The same difference in shape we notice in cases of so-called infantile, or essential, spinal paralysis. In these, as a rule, we find a tendency to club-foot, but occasionally a tendency to flat-foot. Here also the difference depends on the age of the child; club-foot appearing in children who have never walked; flat-foot in such as either had walked before the paralysis set in, or began to do so very soon afterwards.

7. *Thickening of the flat bones of the cranium.* The deposits are usually not very extensive, because absorption takes place at a very rapid rate, in consequence both of the pressure of the brain inside and of the pressure of the pillow outside.

After the rhachitical softening has lasted some time—that time depending in part on the intensity of the process—ossification will take place to an extent greater than normal. This is due to the fact that the new-formed connective tissue is becoming so massive as to compress its own blood-vessels, when, from such compression, the circulation is rendered slower, lime will be deposited very copiously, but rather irregularly, and the result will be a *plus* of lime in such bones, and the condition which has been called “eburnation.” As a rule, then, we observe that a bone which has been the subject of rhachitical softening will, later in life, be found denser than normal bone; osteo-sclerosis will have taken the place of osteoporosis. The curvatures of swelling remain as they were, except that the flattening and asymmetry of the cranium disappear in most cases. But the deformity of the long bones, though remaining unchanged, will, as the child grows, make less and less impression on the eye, simply

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because it is relatively less prominent upon the larger bones.

Thus far I have spoken of rhachitis as an affection of bone only. It was my intention to reach, in a few words at least, the subject of this short paper, craniotabes. But even this could not effectually be considered, unless it was discussed with all its co-ordinate symptoms.

I need hardly say here, that I take rhachitis as a constitutional disease, and one of the grave and frequent nutritive disorders of infancy. Although I hope to prove, at some other place, the intimate correlation of rhachitis, syphilis, scrofula, and tuberculosis from a clinical point of view, as Dr. Wegner, of Berlin, has but lately tried to prove by anatomical and microscopical demonstrations, it is true that the physiognomy of rhachitis cannot be misunderstood. Seldom, if ever, do we recognize a single or a few symptoms; as a rule, we find a large number of symptoms in the same patient.

Long before the swelling of the epiphyses or curvatures of the diaphyses of the long bones appear, we find positive symptoms of general rhachitis in the whole system of the infant. Osseous, muscular, glandular system, skin, blood-vessels, fat, hair, teeth: everything carries the imprint of the disorder. Among the first symptoms I have, at another occasion, described the obstinate constipation of very young infants, which in many cases cannot be attributed to anything else but the neglected development of muscular tissue of the intestinal tract. The first bones in which rhachitis is recognizable are in many instances the ribs, the changes of which I have already mentioned. Usually at the same time, sometimes a little later, say about the third or fourth month, the rhachitical condition of the cranium becomes apparent, so much so that the finger gently pressed upon selected places of the occipital or parietal bones, feels the cranium giving way under the slightest pressure, as if it was not bone that was pressed upon, but thin paper. In order to be certain about the diagnosis it ought to be borne in mind, that these softened portions should not be the margin of the bones along the lambdoid or sagittal sutures, but ought to be found at a

certain distance from the sutures, thus proving that we have not to deal with insufficient development of bone, but with local absorption and insufficient reproduction of bone. I lay the more stress upon this latter fact, as, even as late as this year, a writer as able as Dr. Pepper, in the second edition of Meigs' *Text-book of the Diseases of Children*, Philadelphia, 1870, p. 636, these spots "irregularly distributed," are ascribed "to irregular deficiency of ossification." I may be permitted perhaps to state at this occasion that the very fact that this latest and one of the ablest text-books contains nearly nothing on the subject under discussion—that craniotabes in reality has not found its proper share of attention in our own, the English, and even the French literature—has induced me to point out the most important clinical facts in regard to this subject. I confine myself to clinical remarks only, as the subject is too large a one for one evening, and I believe I know that it will be made the subject of a monograph at the hands of an able and conscientious writer. The softened spots, which I repeat to be the results of rhachitical softening, thickening, and rapid absorption, are very frequently found at a great distance from the sutures. The periosteal deposits will not always be found in the same places: in fact very seldom near the sutures. They will take place where circulation is most rapid and copious and favorable to normal or abnormal nutrition. As a rule bones have very few blood-vessels, but infant bones, and especially cranial bones, are excepted from this rule. Even under normal circumstances, the infantile cranium is succulent, soft, and bluish. There is an easy transition from this normal condition of the infant cranium, which coincides with the general hyperæmia of the head and brain at that period of life, to a pathological hyperæmia which is not at all common. Before any other symptoms are developed, the tossing about, the heat of the surface, the ease produced by gentle friction, cold washing, or oiling, together with the presence of enlarged veins at the surface, point to this condition of the bones, which is a frequent occurrence during life and on the post-mortem table.

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The hyperæmic condition of the cranium of infants is also shown by the frequency of subperiosteal hemorrhages at that age, especially soon after birth, as so-called cephalæmatoma. The external layer, moreover, is very thin, at some points not recognizable at all, so that a slight injury is sufficient to result in extravasation. Even these take place some distance from the sutures. Thus it is easily understood why the rhachitical process, being connected with the nutritive functions of circulation and development, ought not to be looked for in the immediate neighborhood of the sutures, or on the sutures themselves. Their elastic tissue offer, moreover, a greater resistance to absorption than bone. We know that a pulsating tumor, an aneurism, will absorb ribs and sternum, but the pleura will remain intact.

The clinical cause of the predilection of rhachitical absorption for the occipital portion of the head must be sought for in the recumbent posture of the infant. The whole cranium gets softened, more or less; the side on which the patient is mostly resting gets flattened, and the corresponding oblique diameter shortened, but absorption will take place at a number of spots which fulfil the following conditions:

1. Rhachitic deposits must have taken place very copiously.
2. The weight of the brain must fall on the softened spot.
3. And the pressure of the pillow must form a third factor.

Thus, in every instance, one of the sides is flattened, mostly the right; and the majority of the softened spots are found on that flattened right side.

To what extent pressure will influence absorption is perhaps best shown by a case of congenital craniotabes in my own experience.

Cases of congenital or foetal rhachitis are rare. They are so scarce that, for a long time, their occurrence was absolutely denied. Still, as almost every nutritive disorder has been met with in the new-born, either in a progressive stage, or after it has run its full course, there

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is no reason for theoretically excluding the possibility of the occurrence of rhachitis in utero. The drawing I show you of a specimen presented to the Pathological Society, eight years ago, is a fair representation of part of a cranium removed from an infant who lived up to her eleventh day. She was born at full term, with encephalocele. The cerebral hernia protruded through the small fontanel, and comprised about one-sixth of the whole mass of the brain. Only the cranium could be studied with regard to rhachitis, and only small portions of the frontal and parietal bones surrounding the large fontanel could be removed. In these few square inches of bones were between twenty-five and thirty openings of the usual craniotabic nature, nothing but a transparent membrane being left. The bony margins of these thin portions were partly sloping off gradually, partly very steep, and some even thickened. They were spread over the whole surface, some even in the immediate neighborhood of the points of ossification. No recent deposits of soft material had been made under the periosteum. Thus, evidently, the process was of a very early date in uterine life and had run the full course of its usual development, and in my opinion, therefore, the question of the occurrence of not only rhachitis in general, but craniotabes in particular, is to be considered as answered affirmatively.

The specimen proves a very instructive fact, viz., the large number of craniotabic openings in the frontal and the anterior portion of the parietal bones. It is due to the position of the fœtus in utero, and explains beautifully the manner in which pressure, both from inside and outside, will produce absorption. The chemistry of craniotabic bones is by no means different from that of other rhachitic bones. The large amount of water, the increased proportion of organic gluten matter, and the diminution of earthy salts are characteristic of rhachitic bones in general. Of all the other symptoms of rhachitis which are found in every well-developed case, I will mention those only which are found about the head, and are in some connection with *cranial* rhachitis. First in order is the face. In the beginning it is generally fat, pale, rounded,

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expressionless because of its rotundity, of a similar character to the configuration of the body. Many such thoroughly rhachitic children are considered the types of health and infant beauty, because of this very paleness and rotundity. The face gets smaller only when the general nutrition gets impaired. Until then, and sometimes not at all, is the relation of the size of cranium and face disturbed. It was Shaw who, in three different papers, in the London *Medical Gazette*, March 3d and November 18th, 1835, and in the 17th volume of the *Med. Chir. Trans.* of 1843, some time before Elsaesser published his celebrated book on the "soft occiput," studied "the effects of rickets upon the growth of the cranium." In his opinion, "whilst the cranium appears unusually large and capacious, the face is remarkably small, the forehead projects," etc. Evidently he is speaking of hydrocephalic increase of the size of the head, and not of rhachitis only. To the contrary, not unfrequently, the facial bones are the seats of rhachitical deposits and permanent thickening. The influence of rhachitis on protrusion and the character of the teeth is well known; as a rule, however, in craniotabic patients there are no teeth, the large majority of them being not over half a year old. Besides, teeth will appear later, as a rule, than at their normal time of seven or eight months.

The cranial sutures and fontanels will remain patent for a protracted period. The murmur heard over the patent fontanel, which disappears where arachnoid effusion, or ossification, takes place, is not characteristic either of rhachitis or of craniotabes. But there are two symptoms which are frequently met with, not only in well-developed craniotabes, but also in general rhachitis. They are copious local perspiration, and baldness, mostly confined to the occiput.

Although the rest of the surface may not be liable to perspire, the head is moist. The pillow is always wet, frequently drenched. Particularly the occiput is suffering, as evaporation is less free. The cause of this symptom has to be looked for in the general hyperæmia of the cranium (and scalp) I have mentioned before. Besides,

the glands of the head of infants appear normally more developed than in advanced age. I remind you of the prevalence of the secretion of tallow, the seborrhœa of young infants, which, although not a sickness, is so troublesome an affection of the infant scalp during the first year. The unusual development and function of these glands appear to precede the abnormal growth and action of other glands, especially the lymphatic, with advancing age. Moreover, the general muscular debility of rhachitis must influence heart and blood-vessels as it does the voluntary muscles, give rise to passive stagnation and effusion, which shows itself externally as perspiration, and inside the cranium assumes the character of free effusion into the cranial cavity or the ventricles, or the meshes of the arachnoid; or the substance of the brain, in the form of general œdematous infiltration.

The baldness especially of the occiput is presented as a frequent symptom. Either but little hair will grow, or the copious hair brought into the world is but insufficiently nourished in the slow circulation of the thin, hot, and white scalp, is macerated in the soaking perspiration, and falls out, or is rubbed off. The interior of the cranium participates in the craniotabic process as well. The flabby, bloated, sapless, and strengthless condition of the visible parts finds its mate in the brain; circulation is not more vigorous, nutrition not more active. I have stated already, that every symptom belonging to hyperæmia or effusion, from irritation to convulsion, and paralysis may occur during the changes worked by craniotabes in the brain and its meninges. Night terrors, restlessness, rubbing the head, sudden outcries, twitchings, convulsions, may be seen at any moment, the more serious and dangerous, the more rapid the development of the disease has been. There are cases of craniotabes in which but a few, perhaps none, will occur; and I remember many an infant with from ten to twenty attacks a day. I have seen one case, in which the prognosis was pronounced very favorable, because no convulsions had taken place yet, in spite of the severity of other symptoms. The physicians had not left half an hour, before convulsions set in, and had not made their

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next visit before the patient had died of the violence of the repeated attacks. These convulsions are the more treacherous, the less they are ushered in by any of the usual occurrences or symptoms. There is no fever, no tangible change, only the nervous structure is such, nutrition so low, and, moreover, the amount of liquid in the brain tissue so great, as to require but a very slight irritation, not perceptible to anybody, to disturb the equilibrium.

Convulsions are more frequent than paralysis, total or partial, temporary or permanent. One of the most peculiar complexes of symptoms belonging to this little category of paralytic diseases, depending on a diseased condition of the brain in general and craniotabes in particular, is laryngismus stridulus, the crowing inspiration of children. As the views concerning this peculiar affection do not appear as yet, to be identical amongst medical men or writers, I turn to that subject as the last of the principal symptoms of cranial rhachitis.

Laryngismus is emphatically a disease of infantile age. It is observed as well in apparently healthy as in sick children; in their sleep, or while they are awake, playing, eating, singing, or to the contrary, when irritated, or excited. The first stage of an attack of laryngismus is a sudden and entire apnœa. Respiration is stopped suddenly, completely, for a few seconds, even for a minute, the face is bloodless and pale, and cyanotic in attacks of long duration, the skin cool, the heart scarcely perceptible, the entire muscular system in a state of paralysis. The second stage is that of beginning reaction to this complete inactivity; the recurrent branch of the pneumogastric nerve commences again to stimulate the function of the muscles of the glottis, and the spinal nerves again enliven the other respiratory muscles to such an extent as to produce a forced, deep, "crowing" inspiration. In the third stage, finally, reaction is complete. Short convulsive expirations restore the functions of the respiratory organs to their former condition. Attacks of great intensity and long duration are generally attended with contractions of the hands, and even general tonic convulsions of the trunk (opisthotonus) and lower extremities. Sometimes

general eclampsia has been observed to accompany the attack of laryngismus, but also to return without an attack, or an attack of laryngismus to return without eclampsia. Involuntary evacuations of the bowels have been observed during the attack; these are the consequences of paralysis of the sphincter muscles. Laryngismus is seldom fatal; a large number of attacks have sometimes occurred in a single day. The disease is apt to last for months and even years. Whenever death ensues in the attack, it does so in the first stage.

The mildness or severity of the attacks of laryngismus depend on both the constitution of the patients and occasional causes. The milder form is particularly recognized by a milder appearance of the first stage, viz., the sudden paralysis of the respiratory muscles, and the slightness of the accompanying carpo-pedal or other symptoms. Of this kind are those mild attacks which have been described by Rilliet and Barthez, Hérard and Rankin, and called "holding-breath spells" by J. R. Forsyth Meigs. Here the first stage is not very violent, and crowing expiration is not always perceived, but in the cases witnessed by myself, I have never missed the convulsive expirations constituting the third and last stage. Altogether, I am unable to discover any other difference between an attack of "laryngismus," and of "holding-breath spell," but that of a different severity of symptoms of the same affection; for in my mind there is no doubt that the assertion, that the latter "never occurs spontaneously, and never during sleep," and that "the most frequent cause of the paroxysms is contraindication; that they are determined also by fright, pain, and crying," is either not quite correct, or not quite complete.

The symptoms of the first stage of laryngismus cannot be explained except by a functional trouble, by paralysis perhaps of the oblongated spine, perhaps of all the nervous centres together. Paralysis of the muscles of the glottis alone is unable to produce all the symptoms of the first stage of laryngismus; for by cutting a recurrent nerve such general symptoms could never be produced. And the severing of both the recurrent nerves gives rise to real

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suffocation, pretty rapidly, but not at all suddenly; lungs and brain become hyperæmic, and the heart and cutaneous veins full of blood; whereas post-mortem examinations in laryngismus show a positive absence of hyperæmia in the brain, and no, or very little, blood in the heart and cutaneous veins. Death ensues in laryngismus in the same manner as in animals whose oblongated spine has been cut. They die either instantaneously, both respiration and circulation ceasing at once, or some few contractions of the extensors of the trunk and lower extremities are observed before; local hyperæmia is found nowhere, neither in the brain, nor lungs, nor heart.

As to crowing inspiration, it does not exactly belong to the attack of laryngismus stridulus proper; it, as are also the convulsive expirations, is a symptom of returning reaction, that is, the recommencing of nervous and muscular functions. It is also met with in catarrh of the larynx, where the muscles of the vocal cords are spasmodically affected, and is, therefore, by no means a pathognomonic symptom of laryngismus.

This affection is mostly observed at the time of the first dentition, about the second half of the first year; this period is one of general and rapid development of all the tissues and organs of the infantile body, like that of puberty, which also excels by its general rapid development. It is but natural that neuroses should be frequent in either, from this very physiological fact; and so they are indeed. As in all cases of nervous diseases, however, so have all sorts of influences been accused to be the causes of laryngismus: indigestion, cold, fright, morbid predispositions, ascarides, hypertrophy of the thymus gland, and every one of the imaginable affections of the pneumogastric and sympathetic nerves; and certainly dentition, the nightmare of both the public and many medical men. They may almost be excused by you on learning that even such men as Marshall Hall direct in laryngismus the gums to be incised, in different places and directions, once, twice, and even three times a day, and expect a cure from this sort of butchering art. I warn most emphatically against following his advice to the extent in

which it is given. This readiness to operate on helpless children who are so unfortunate as to "teeth," that is to say, to be from six to thirty months old, is, to say the least, a mistake.

The large number of causes to which laryngismus has been attributed, and the various mistakes that have been made in the determination of its nature and character, have given rise to a number of names for this very same affection. Among them are foremost, besides laryngismus stridulus, apnœa of infants, thymic asthma, croup-like inspiration, crowing inspiration, spasm of the glottis, paralysis of the glottis, suffocative asthma, stridulous angina, internal convulsion, and others. The difficulty in finding a correct interpretation of the symptoms, and even accurate names, had been so great, that the disease has become known by the name of "Kopp's asthma." Even this is incorrect; for Kopp, who wrote in 1830, has not been the first to give an exact description of the disease, moreover with an erroneous etiology, as he was preceded by Hamilton in 1818, John Clarke in 1815, and Alexander Hood in 1827.

I have stated that the cause of laryngismus must be looked for in a nervous centre; at all events there is no disease of any of the respiratory organs which exhibits similar symptoms, and post-mortem examinations have resulted in nothing that could explain those symptoms by any local alterations in the lungs or heart. Old Goelis already describes cases of mild laryngismus in connection with chronic hydrocephalus. Keitel found, besides a hypertrophied and degenerated thymus gland, the skull soft, and its sutures and fontanelles large, both the osseous and cerebral tissues soft and hyperæmic, oblongated spine also soft, its membranes congested, and a tablespoonful of clear serum in the upper portion of the vertebral canal. Marshall Hall once found the oblongated spine harder than normal; Evans made the observation of a child born with spina bifida, who would have an attack of laryngismus whenever the liquid of the sac was pressed into the vertebral canal. Caspari found the substance of the spine solid and white, and its dura mater much injected. The sinuses of the

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brain were filled with an enormous amount of black and thin blood, the substance of both the large hemispheres and cerebellum very soft. The phrenic nerve, moreover, was uncommonly hard, but the pneumogastric nerve "appeared more similar to the brain."

After all, the uniform presence of some alterations in the nervous centers appears to prove my first proposition, that laryngismus is the symptom of a deep-seated anomaly. In many cases congestion and inflammation of the membranes, especially the brain, have been found, together with their consequences, viz., more or less transudation. This process may take place very slowly indeed, and very generally exhibits a slow progress. Many cases of cerebral or meningeal effusion, undoubtedly, take place without laryngismus, but that laryngismus should occur without any affection of the nervous centers is more than merely doubtful. But there is one disease which appears to be the fundamental cause and origin of laryngismus. It is rhachitis. Particularly it is the very form of rhachitis found in nurslings, which is apt to bring on severe and general symptoms, viz., the rhachitical softening of the cranial bones, or craniotabes. Craniotabes is usually connected with meningitic processes, effusion between the meninges, or into the brain and its ventricles; and thus its direct connection with a large amount of cerebral symptoms is easily understood.

Old authors, whose reports Elsaesser has collected in his book on "the soft occiput," although they did not understand the importance of the rhachitical softening of the parietal and occipital bones, relate a number of post-mortem examinations and cases illustrating the subject. Of the cases of Kopp, one who died at ten months, had a very large fontanel, ununited sutures, and very flexible cranial bones; in another who died before the end of the fifth month, he mentions flexible cranial bones, and large fontanels. Caspari relates the case of a child, which was very large and fat, but always had "phlegm on his chest," and a large head, large fontanels, and swollen epiphyses; he adds, that the majority of his infants affected with laryngismus stridulus, had a rhachiti-

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cal predisposition. Pagenstecher speaks of a child who was very large and fat, and was affected with convulsions in his seventh month, and afterwards with attacks of apnœa. Being sick so long, it grew emaciate and thin, and his skull had quite a peculiar, no longer spherical, but remarkably irregular and asymmetrical form. Hirsch found, twice, a large head and large fontanels. Keitel describes the attacks, and body of a child who died in his twenty-second month, and had mostly ununited sutures; the small, triangular fontanel remained still open; the quadrangular was unproportionately large, and the skull soft and thin. Hachman has a similar case. In Gunther's child, after weaning, "a true rhachitical constitution" developed itself, and gradually also the attacks of laryngismus. Landsberg also found the sutures open, and delays in protrusion of the teeth. In one case of Hauff's, all the cranial bones appeared of a dark blue color, and were so little ossified as to be easily cut by means of a knife and scissors, and so thin that the squamous parts of the temporal bones had the thickness of good-sized paper. In another, the chest was very similar to the "chicken chest," and the commencement of rhachitis could not be denied. A child of Staub's had already in its first year the unmistakable symptoms of rhachitis, and had its first tooth at eighteen months.

Many such cases could be collected from literature; but those above, taken from older authors, suffice to illustrate the connection between craniotabes and laryngismus. It is true, however, that not every case of this affection must necessarily be the result of craniotabes. Of modern writers, Jenner reports to have found craniotabes in all his cases of laryngismus but two; and Wiltshire, who considers rhachitis and tuberculosis as coördinate manifestations of scrofula, speaks of tetaniform convulsions, with thymic asthma, in cranial rhachitis. Friedleben does not recognize the thymus gland at all as a possible cause of laryngismus, but insists upon craniotabes being its universal source. I have seen but a single case in my life, in which I found no craniotabes. It was that of a baby of about five months, who had suddenly died in an attack of laryngismus which had not

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been preceded by more than a very few similar ones. In that case I have not been able to detect a single cerebral or meningeal trouble to which I could attribute the affection; I found, however, a very large and solid, thick thymus gland, which, although the limits of normal size and weight of that gland allow a great latitude, I felt like taking as hypertrophied.

I have, therefore, not been able to change the opinion expressed by me in the *New York Journal of Medicine* (Jan., 1860), and in the chapter on *Dentition and its Derangement* (Vol. II, page 159), upon both of which I have drawn in these remarks on the subject. Occasionally, however, there is a case where the proof of the ailment of cerebral origin is absent. Thus Elsaesser reports the case of a child who had laryngismus brought on by whooping-cough, not, however, before his craniotabes had healed; and there are a few cases of laryngismus in the second or third year, where craniotabes is generally no longer present. Thus other causes may bring it on; but do not forget that nervous affections will oftentimes not disappear with the removal of their causes, and that, together with craniotabes, alterations take place inside the cranium which are not so liable to heal as the affection of the osseous tissue itself; therefore, craniotabes may still be the cause of laryngismus, even where it appears to have entirely passed by. Rhachitis is almost always the great predisposing cause, and thus the last and proximate causes of an attack of our disease, as we find them enumerated in the text-books, such as fright, anger, cough, protrusion of a tooth, etc., are assigned their right place as being of but occasional and temporary importance. By the defective condition of the cranium the brain is more subject to external injuries, concussion, quick movements of the head, improper carrying on the arm, lying on a hard pillow, rocking, and high temperatures, both artificial and solar; and, finally, we must not overlook the importance of such alterations as invariably take place, in rhachitis and craniotabes, in the nutrition of the system and the condition of the brain. At all events, you will hardly ever be mistaken in your etiology, when on meeting with a new case of

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laryngismus, you examine for craniotabes. Whenever a child with laryngismus is brought to me, my first attention is given to the occiput and epiphyses, as my first prescription is almost invariably the regulation of diet and general anti-rhachitical treatment.

PROGNOSIS.—In considering the prognosis of craniotabes, we must take into account the nature of rhachitis. Rhachitis is not in itself a malignant disease, but it is a disease running a very slow and non-typical course. It is of like nature with all the other grave nutritive disorders with which I have compared it before, such as syphilis, scrofula, and even tuberculosis, and to all of which it is in some degree related.

The prognosis in each case of craniotabes will depend very much upon the original course of the disease, whenever such course can be made out. The origin may be traced, for example, to hereditary tendency, to innutrition, to chronic diseases of the digestive organs, to grave chronic affections of the organs of respiration, to bad hygienic conditions, as over-population, bad air, etc.

Again, the prognosis will depend greatly on the duration of the disease at the time the case comes under the physician's notice. It will depend, furthermore, upon the number and the character of the complications which have up to that time shown themselves. When the case is seen at a tolerably early stage, the prognosis is rather favorable; when seen late, after a certain amount of meningeal effusion has taken place, it is less so. But no matter how promising the case may appear, it is not safe to give anything like an unqualifiedly favorable prognosis until a certain number of weeks shall have elapsed from the commencement of the treatment. I generally consider a period of six weeks sufficient to change the whole aspect of the case, and feel justified in promising the parents with tolerable certainty that the child will get well, unless within the first four or six weeks untoward circumstances should occur.

Rhachitis of the cranium and the brain does not in itself tend to run a more unfavorable course than the same disease affecting any other parts. It becomes more dan-

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gerous only because the brain is a more important, a more vital organ, so that changes taking place in it or in its meninges may seriously imperil life. While in no case where effusion has taken place, either in the brain or in its meninges, is the danger slight, yet there is one point which may properly lead us to regard it as less grave; that is, the slowness of the process of effusion: the slower the process the less the danger. We know to how great an extent peritoneal and pleural, even pericardial, effusions are tolerated when the process extends over a long period. And so in this case experience has shown that under similar conditions large amounts of fluid can be retained inside the cranial cavity without seriously endangering life, and even without impairing the most important faculties of the brain. We know of only one condition attended by effusion where the prognosis is absolutely fatal—that is, the case of acute tubercular meningitis, otherwise acute hydrocephalus, when we find the symptoms of general paralysis, with increased heat and innumerable pulse, setting in. Only in such a case are we justified in saying that the child will certainly die.

So far as the shape of the cranium is concerned, it is almost always restored to its normal symmetry, or nearly so; only the traces of rachitical deposits, especially on the forehead, will remain during life-time; the peculiar prominence of the frontal tubera, and the square quadrangular shape of the head points to a past rachitis. Now and then there are also cases in which the flattening of either the right or the left parietal region remains after recovery has taken place. These are cases in which craniotabes set in at an unusually late period of life, at a time when the brain had attained almost its normal size, and when portions of the sutures were already, if not ossified, at all events virtually closed.

TREATMENT.—In the treatment of craniotabes the same indications must be met as in the treatment of general rachitis. These indications are furnished partly by the symptoms of the disease itself, and partly by the principal causes of the disease. In those cases where the

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cause was improper nutrition, the indication is clear enough: nutriment, proper and sufficient, must be given. In cases where disorders of the digestive or of the respiratory organs have been the chief agents in producing the malady, these organs require attention. But as a rule, craniotabes, as we have seen above, is one of the very first symptoms of rhachitis, and in the great majority of cases we have no disease of the respiratory digestive organs to fall back upon. We have to take craniotabes as, so to speak, original, and to treat it as such. Craniotabes is seen as early as the considerable muscular debility that is very apt to show itself in the obstinate constipation of the infant. This constipation, moreover, tends to increase the cerebral congestion beyond the normal, physiological condition. Thus the treatment must begin very early in life, and must be directed against the general faulty nutrition.

As a rule it will be found that craniotabes not only tolerates but requires the use of cod-liver oil, just as do cases of general rhachitis and of rhachitical constipation. The passages are dry and white, and commonly contain a great deal of caseine; and the first step in the right direction will be to prevent the solid coagulation of the milk, be it mother's milk or cow's milk, in the stomach. To that end it is important not to give the milk unmixed, but to mix it either with simple gum, or, better, with a decoction of barley or oatmeal, these agents preventing the sudden contact of the gastric acid with the milk, and so preventing its firm coagulation as soon as it reaches the stomach. This admixture of either barley-water or oatmeal gruel with the food will, as a rule, be found to diminish the amount of caseine in the discharges to such an extent that, in many instances, their color is almost immediately changed. As I have said, on other occasions, I prefer the barley or oatmeal to any other admixture, simply for the reason that these contain more phosphates, together with iron and proteine substances in sufficient quantity to supply the organism with the necessary nutritive elements.

In all those cases in which the coagulation of the milk

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in the stomach, and the hard, costive passages are to be attributed to the presence of acids in the stomach, anti-acids are to be given—carbonate of lime, or bicarbonate of soda, or carbonate of, or calcined, magnesia. Where the costiveness is very obstinate, either the magnesia or the soda should be preferred to the chalk. In any case, however, the alkaline treatment should not be continued too long; since most of the alkalies have a disintegrating effect on the consistency of the blood, in a similar manner to the acids, either vegetables or mineral, which also are apt to disintegrate the consistency of the blood to a great extent when given for a long time.

Another suggestion about milk diet. Some authors have expressed the opinion that the phosphates were kept dissolved in the blood by a superabundance of lactic acid, and were, in company with the latter, eliminated through the kidneys and bladder. The question is not settled yet; still, if it contains a particle of truth, it points to the advisability of limiting the amount of milk, at least unmixed, as food for rhachitical children.

Many cases of this constipation will be found to get well on simply adding sugar, a drachm or more dissolved in tepid water, to every meal, either of breast-milk or artificial. Its administration has frequently been of great service to me.

The general anti-rhachitic treatment—cold bathing, salt bathing, friction, the administration of iron, of phosphate of lime, of quinine—holds good for craniotabes, just as for general rhachitis. Concerning the administration of phosphates, it is known that the authors do not agree as to its advisability. It has been asserted that to give phosphate of lime does, at all events, no good, because it has been proved that, under certain circumstances, at certain periods of the rhachitical process, a large amount of phosphate of lime is eliminated from the system. It has been said that just as much is eliminated as can be introduced by medicinal methods. Now it is a fact that, especially at the beginning of the rhachitical process, the quantity of this salt eliminated by the kidneys is indeed very large. But this indicates no excess of elimi-

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nation of the phosphate from the organs and tissues already formed; it indicates simply, that the normal amount is not assimilated. The physiological elimination of the existing tissues is not at all disturbed in rhachitis; but evidently there is a deficiency of assimilation, and hence the nutritive disorder. A portion of the phosphate of lime introduced, whether as food or as medicine, takes no part in the nutrition of the organism, but is thrown off at once, and so, at certain stages of the disease, appears superabundantly in the urine. Still, there are analogies in our ordinary therapeutics which authorize us to expect advantages from the administration of this medicine here. Take, for example, the customary exhibition of iron in considerable quantities in many diseases. We know that a very small part of the amount of iron given is really assimilated; that almost every particle of it is expelled from the system, without ever having passed through the blood, almost as soon as it is taken. Yet we believe that we find benefit from giving just such doses—doses which, if we were to consider only the color and condition of the fæces, would seem a great deal too large. Similarly it is not improbable that phosphate of lime may be given with much advantage, even if a large portion of it is eliminated without having ever undergone assimilation. At least, before the question is entirely settled, I think we are justified, in our treatment of rhachitis, in resorting to this remedy, and to the phosphates generally, especially when given in connection with proteine substances, which seem to render them more readily assimilable.

I must not conclude these general remarks without saying a word or two on protracted nursing. Breast-milk, with the public at large, is not only a nutriment, it is considered a medicine. There are a great many mothers who believe to confer a boon on their children by nursing them until they are twelve, sixteen, or twenty months old. Before this society I need not allude to the impropriety and injury done by such a proceeding. I have seen a great many cases of rhachitis developed in consequence of nothing but protracted nursing. That

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weaning, and replacing the stale and incompetent breast-milk with meat or cow's milk, or barley, etc., is often an absolute necessity, I need not add.

Thus, there are many cases of rhachitis which occur in consequence of, not in spite of, nursing. Very many mothers are but incompetent nurses, and in many instances the employment of a strange nurse, or artificial food, is preferable. When I find rhachitis in a very young infant without very manifest causes of the disorder, it is but just to suspect the mother's milk as one at least of the dangerous elements.

Böcker found in the milk of a mother who nursed a rhachitic child until it died, fifty-three days old, in 1000 parts, but 13.111 of caseine, 23.31 of butter, 60.458 of sugar, and but traces of phosphates (0.089).

Friedleben examined the milk of two women whose rhachitic children recovered after their diet got changed. One was a pale, fat woman, of forty-six years, who had been bled several times during her pregnancy. The analysis yielded—

Water	87.830
Butter	4.390
Caseine, sugar.....	7.54
Inorganic matter.....	0.24

The milk of the other woman was also thin and serous; she worked hard, and suffered from uterine hemorrhage.

Her milk contained—

Water	91.307
Caseine, butter, and sugar.....	8.509
Phosphate of lime	0.099
Carbonate of lime	0.010
Alkalies	0.073
Iron, silicium	0.002

Normal milk contains—

Water	86.60	
Caseine	3.50	} 13.20
Sugar	6.20	
Butter	3.50	
Soluble salts	0.06	
Insoluble salts	0.14	

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So far as concerns craniotabes especially, there are a few indications for treatment in addition to those presented by general rhachitis, because there are several symptoms which belong to the brain alone, and not to the general rhachitic process. Such symptoms are cerebral irritation and effusion. Those heads which are apt to perspire, which are known to be already the seat of irritation or effusion, require to be kept cool, to be washed very frequently with cold water. Whatever may give rise to any local congestion ought to be avoided, and direct means ought to be resorted to in order to relieve the dilatation of the blood-vessels and the consecutive effusion. Quinine has been alluded to as a remedy which will also fulfill this indication. In those cases where there is a good deal of passive congestion, I believe I have seen a good effect from the constant use of ergot. In those cases, on the other hand, where effusion had taken place, or where there was slight strabismus, with now and then a tonic or a clonic convulsion, I cannot say that ergot has done much good, nor could I say that I have seen much good result from any medicinal treatment resorted to for the purpose of reducing the amount of effusion. It is not an unusual thing for such an effusion to become absorbed, after a long time, and for complete recovery to take place, but as a rule our remedies given for the direct purpose of removing it are unavailing.

Whenever convulsions set in, the symptomatic treatment of this symptom becomes imperative. No convulsions should be allowed to continue if there is a possibility of checking it by chloroform. The longer a convulsion lasts, the more surely will it give rise to greater congestion and more effusion than before. Chloroform, therefore, should be resorted to immediately. The tendency to convulsions will be relieved by chloral, by bromide of potassium, and very frequently also by morphia. I have often seen that the irritability of these infants, and their tendency to go into convulsions, has been checked by an occasional dose of one-fiftieth of a grain of morphia. How this acts in these cases I am not able to say—the less so since the direct effect of opium on the

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vessels of the brain, whether to dilate or to contract them, does not appear to be yet determined.

The attacks of laryngismus stridulus require very little treatment indeed. They demand no special general treatment, and the individual attacks last too short a time to be influenced by any medical treatment addressed to them directly. It will do good, however, to bring on the second stage, the stage of reaction, by changing the position of the child, and by sprinkling or pouring cold water over the face and head.

CONGENITAL LIPOMA

ACCORDING to E. Lancereaux (*Traité d'anatomi path. I.*, p. 341) lipoma is developed at every age; it has been observed in old people and in young infants. Even congenital lipoma has been known to occur. It has been met with by a hereditary disease; thus Murchison has the cases of a father and two daughters with fatty tumors on almost corresponding parts.

This is all he has to say on the subject, nor have the other text-books on pathological anatomy more information to convey. The following pages will give a resumé of the facts recorded, with a few cases of my own, and such additional remarks as appear indicated by the interest the subject seems to command.

General obesity, that is hypertrophy of the adipose tissue under the whole of the surface and in the interior of the body will be rigidly excluded from my consideration. Thus the cases of infants and children weighing from fifty to a hundred pounds or more in very early years form no part of this paper, which has to deal with local changes rather than with the results of universal malnutrition resulting in universal adiposity. Perhaps one of the most interesting cases of the kind is that of a fetus of six months reported by Deutschberg (*de tumoribus nonnullis congenitis. Diss Vratislav, 1822*).

Local hypertrophy of the adipose tissue will occur sometimes to such an extent as to increase the size of a limb enormously. The cases of Busch and Rose will be noted below. The *hand* of a boy of sixteen years, described by Henderson in his *Notes on Surgical Practice in Shanghai (Edinb. Jour., Aug., 1877)*, weighed eight pounds. The extremities are often increased both in length and circumference. In these cases the development of the bones is liable to correspond with that of the adipose tissue; thus in Little's case of the *right lower extremity* of a child of

three years (Trans. Path. Soc. London, 1867, XVII., p. 434). In the cases of Juengken (or Ideler, Diss. inaug., Berlin, 1855), Friedberg and Wagner (Schmidt's Jahrb., III., Suppl., 1842, p. 66), and Fischer (D. Zeitsch f. Chir., XII., p. 16, 1879), lipomata complicated the general hypertrophy of a whole extremity. Of a similar nature is the case of a girl of six years reported by Burow (D. Klin., 1864), with universal hypertrophy of the *second and third toes* and corresponding metatarsal bones, and that of a man of thirty-two years, reported by Wulff (Petersb. Med. Z., 1861, p. 281). The *volar part* of the hand, as far as it corresponded with the three first fingers, was hypertrophied from birth. Independent increase had commenced but recently.

With this exuberant growth other anomalies are apt to be combined; thus Fischer observed a supernumerary nail though without a phalanx of its own. The swelling is mostly of irregular shape, is not infrequently found at a great distance from the heart. In many cases impeded circulation may bring on or aggravate the morbid process. The position of the limbs in the uterus may influence both arterial and venous supply. The superabundance of the latter is apt to increase the formation of œdematous fat, as for instance it does to an excessive degree in acardiac (acephalous) monsters the whole circulation of which is venous. On the other hand, in a more advanced stage of fetal development, or in the infant the preponderance of venous circulation have the effect of diminishing the size; for parts of the body, particularly extremities, inflicted with extensive venous angioma lose in circumference, strength and power.

Congenital hypertrophy, with the development of a great deal of fat, is mainly found in the fingers, the volar side of which is liable to carry a large quantity. The presence or absence of fat in them or elsewhere, depends on the time in which the congenital hypertrophy started. In the first half of intrauterine life no fat is formed; thus local hypertrophies dating from that time are complicated with gelatinous or myxomatous enlargement of the inner layers of the skin; such, however, as originated in the second

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half of fetal life will be found complicated with an abnormal concomitant development of fat.

The extremities will not be the only parts to exhibit such anomalies. The skin of the occiput and back, the abdomen, the upper extremities, besides the calves of the legs and the dorsal and plantar surfaces of the foot are the seats of such deposits. What Virchow called soft elephantiasis consists of the latter anomaly, joined to a copious deposit of adipose tissue. On the head lipomata are found but very rarely. Both Rokitsky and Virchow agree on this point, and also in the cases of that fact. They look for the occurrence of lipoma in soft adipose tissue, and do not expect to find it in the dense connective and elastic tissue of the scalp. Therefore the case of lipoma fibrosam in that locality described by Dr. Carl Fieber (*D. Zeitsch. f. Chir.*, XII., p. 112, 1879), is a rare exception from the rule. The infant of the woman from whom Briolle, whose case will be referred to later, extirpated an immense lipoma, is reported to have had a tumor on the head; but its nature, as the child had died long ago, was not ascertained: as a rule it must be taken for granted that lipoma will form under such circumstances, and in such localities where fat is normally deposited in disproportionally large masses. It has to be taken as the (pathological) excess of normal (physiological) growth. Thus in the adult, lipoma will mostly be found on the chest, shoulders, abdomen, and congenitally it will appear where physiological growth of fat is rapid. After having been developed, its increase is generally slow; as a rule slower in the adult with an acquired, than in the infant with a congenital tumor. Nor is this the only difference between the nature of lipoma occurring in these different ages. From the cases I am about to enumerate it will appear that contrary to what we know of the capsulated form of adult lipoma, the congenital variety is apt to be diffuse, and not capsulated.

My own cases are as follows:

I. Mary C——, aged three years; admitted May 28, 1879, to Mount Sinai Hospital.

Family history good. A swelling on both sides of the vertebral column in the *lumbar region* was noticed immediately after birth. It increased in size slowly up to six months ago, when it began to grow rapidly. It was not painful; she was playful; and her appetite and general appearance were good, although she was delicate. She had two brothers and two sisters in good health.

When admitted, there was a swelling in the lumbar region, extending five inches or more to the right and to the left of the lumbar vertebral column. It was soft, elastic and lobulated, and from three to four inches in its vertical diameter. It was not painful on pressure, and the skin over it was not changed with the exception that a few blood-vessels were enlarged. There was a smaller swelling on the (left) gluteal region and another on a level with the scapula; the latter being the smaller of the two and having a diameter of two or three inches. Both of the smaller swellings felt softer than the one situated in the lumbar region; still they were lobulated, and to a certain extent, elastic. There was no doubt that all these tumors were lipomata. On the *third* of June a semi-circular incision about ten inches in length was made over the main tumor, with its concavity downwards. No capsule was found. Large masses of fat between the skin and the vertebral column were removed; still it was not possible to dissect deep enough to remove all the fat present; the operation was done under Lister, and a Lister dressing was applied. The condition of the patient after the operation was fair. There was a great deal of oozing from the wound in the night, and the dressing was removed and a new one applied.

On the *fourth* of June there was but little discharge, no pain; but the pulse was 150, respiration 30, and temperature $101\frac{1}{4}^{\circ}$ F.

June 6th. The temperature and respiration remained unchanged, but the pulse had fallen to 116. The patient was quiet, had slept, and there was almost no discharge.

June 8th. Pulse, respiration and temperature quite normal; there was an itching papular eruption over the whole of the body and the extremities.

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June 9th. The general condition of the patient was the same as on the eighth, with the exception that during the night she had four dysenteric stools, and for those opium and bismuth were administered.

June 10th. Eight passages consisting mostly of mucus. At the same time the wound looked badly and began to slough.

June 12th. Her stools were slightly dysenteric in character, and the wound looked no better.

June 13th. The patient was pale and emaciated. Temperature $98\frac{3}{4}^{\circ}$ F. At five P. M. her pulse was 132, respiration 36, and temperature $102\frac{1}{2}^{\circ}$ F.

June 14th. Two dysenteric passages. A large amount of suppuration from the wound and of an offensive odor. The wound has sloughed and began to ooze; a hair-lip pin was introduced to hold its edges together.

June 15th. Temperature but slightly elevated and pulse better, and the wound also presented a more favorable appearance. Only one passage from the bowels during the last twenty-four hours. During all this time the wound had been dressed daily under Lister.

June 17th. Considerable sloughing at the edges of the wound. A thorough application of a twenty per cent. solution of carbolic acid was made, and was repeated a number of times. The child was fed well, took quinine regularly, and was stimulated freely with alcohol and camphor, but she grew paler, emaciated considerably, and the wound continued to slough. There was a great deal of discharge, which always had an offensive odor.

Several times hair-lip needles were applied for the purpose of reducing the gaping of the wound. Though the dysentery was relieved at about this time, there was slight erysipelatous inflammation of the edges of the wound.

There was never any fever, but emaciation continued, anemia increased, and the patient died on the 2d of July.

II. A boy of three years was sent by Dr. I. Oberndorfer from the West Side German Dispensary. He had in and below his *left groin* a swelling of irregular shape, apparently originating in the femoral ring. It measured from three to four inches in the axis of the femur, and from two

to two and a half inches transversely. Its outlines were not at all smooth, even and regular, but irregular and nodulated, as was also its surface. The blood-vessels of the surface, which was quite normal, were but slightly enlarged; pressure gave no pain, and resulted in no reduction of size. The tumor had been observed through more than two years, and had grown larger, but never changed its location. Removal was proposed, but at that time refused.

III. A lipoma, probably congenital, I observed on the *back* of a man of fifty-five.

This patient of mine, then thirty-five or forty years of age, mentioned in the course of conversation some twenty years ago the presence of a tumor on his back. I found it located over the ninth and tenth dorsal vertebræ, of the size of a walnut, not changed in color, not painful, indolent on pressure, not reducible in size. The blood-vessels in the neighborhood were but slightly enlarged. It appeared nodulated, soft, but offered a certain resistance. He was certain that it had been in the same condition as long as he could remember, and had been told that he had never been without it. I advised an operation only in case the tumor would ever commence to grow. It never did, however, and twenty years afterward, when he died, it was in exactly the same condition and of the same size.

IV. A female child, a patient of Dr. Moëller, was born on January 26th, 1882, and died April 4th, 1883. She was the fifth child of the mother, and weighed $13\frac{1}{2}$ pounds when born. She cried and drank normally, lips rather cyanotic, but not the nails, and the general surface a trifle livid. A cephalhæmatoma on the right parietal, and one on right occipital, bones.

Left foot large, first and second toes normal, third and fourth webbed (bones separate) and of three times their normal size; they turn to the right, so that there is quite an interstice between the fourth and fifth, the latter of which seems as if it were joined laterally to the metatarsal bone. It is larger than the big toe. The left foot has a circumference of 13, a length of 9 centimeters,

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the right 9, and 7. The circumference of the left calf is smaller, however, than that of the right, which is flabby and soft. Otherwise the right lower extremity is normal up to the knee; the knee joint has but a limited voluntary motion, the normal backward motion of the leg (flexion) is impeded, but anteriorly the knee bends so as to allow the toes to touch the abdomen. No patella discovered. On the right thigh a large, soft, lobulated tumor, not compressible, nearly surrounds the limb, with the exception of the posterior aspect. The circumference of the right thigh is 24, that of the left 16 centimeters. The left lumbo-dorsal region is swelled, soft, adipose, not compressible; the swelling is marked in the left renal region, somewhat nodular, and extends to the right of the median dorsal line. The whole right side of the body, from the abdomen and renal region upwards to the axillary region, is occupied by a diffuse, not quite soft, somewhat nodular, very extensive mass, the elevation of which over its neighborhood is estimated at from one to four centimeters. The surface has the normal color, with the exception of some large spots which are the seats of subcutaneous hemorrhages of a nature similar to what is noticed on the patient's palate. The boundary lines of the diffuse swelling are sometimes straight, sometimes curved. There are no dilated veins on the surface, but from about the tenth rib upwards there is an almost square space (centimeters 14 x 14) which is more or less uniformly brown, succulent, and changing under the pressure of the finger, of teleangiectatic nature. Its posterior boundary line is straight, the anterior curved.

The case, then, was one of gigantic growth of the left foot, localized lipoma of the *right thigh*, diffuse lipoma of most of the surface of *abdomen and chest*, and teleangiectasia of the right side of thorax, mostly anteriorly.

In the course of time other symptoms showed themselves. On September 2d the head was found to be oblique, flattened to the right and posteriorly, left half of head and face longer than right, left ear is an inch back of the line of the right, left eye larger than right, convergent strabismus and convulsions of the face now and

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then, intellectual functions rather dull, occasional convulsions, now and then universal, sometimes about the face only.

In the last few months of life large subcutaneous abscesses developed and discharged considerably. The autopsy corroborated the diagnosis and revealed besides hydrocephalus and perinephritic abscess on the left side.

V. My most interesting case is, perhaps, the following:

A case of lipoma of the *lumbar region, complicated with spina bifida*, came under my observation many years ago. It has been described by Dr. B. F. Dawson in the *Amer. Jour. Obst.* (Feb., 1871), and is the same case referred to by me in the same journal (XII., 1879, p. 755), and again by Dr. Dawson in the *N. Y. Med. Journal* (1883, p. 613). According to Dr. Dawson's description, "a tumor the size of a large orange was seen over the lower lumbar region. Its appearance was somewhat flattened and very slightly pediculated, and its color was uniform with the surrounding skin, with the exception of an irregular spot in the center about an inch in diameter, of a mottled color, which was evidently due to friction of the clothing, etc. The exact location of the base of the tumor was found to be over the two last lumbar and the first sacral vertebræ, but not in the median line, two-thirds at least of the tumor being to the right of it. To the feel the tumor was uniformly tense and unyielding, though not hard, and by grasping it with the fingers considerable mobility was obtainable. Continued and very firm pressure failed to diminish its calibre, and produced no marked impression on the appearance or behavior of the child."

Under the supposition that the case was one of uncomplicated lipoma, its removal was undertaken. It was found to be diffuse, one and three-quarter inches in thickness, not capsulated, and covering a small sac of spina bifida, "containing not more than half an ounce of fluid, of the size of a small thimble, just admitting the little finger to the depth of three-fourths of an inch."

The literature of our subject is not very extensive.

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Leclerc de Buffon (hist. nat. gén. et part., etc., rédigée par C. S. Sonnini, Vol. XX.), has the case of a girl of three years, who had on *abdomen, face and extremities* a large number of tumors, yellowish, covered with hair; raised above the level of the skin. All over the back down to the lumbar region, the tumors were larger and numerous. Probably this is the same case seen, when a few years older, by Lavater and Wünsch.

Thomas Bartholinus reports the case of a girl whose *whole body* was covered with villous yellowish brown spots and large cutaneous excrescences. He expresses the conviction that her mother lived in concubinage with a monkey.

Walther saw, in the General Hospital of Vienna, in 1800, a woman covered *all over* with lipomata. They were small, bottle-shaped, and mostly pediculated. They were congenital.

Arlt (Lehrb. III., p. 376), describes a congenital lipoma of the *left upper eyelid* complicated with congenital coloboma. It consisted of two parts, was soft, elastic and encysted. The two were located in the episcleral tissue.

Congenital lipoma of the *tongue* has been observed by Bastein (Bull. de la société anat. de Paris, Nov., 1854). The patient was a man of 21 years, who had a tumor on the right side of his *tongue* since early infancy. It had finally reached the size of a pigeon's egg, then remained stationary and contained besides, fat, cartilage and bone.

Also by Lambl (Beob. u. Studien aus dem Franz Joseph Kind. Spit, p. 181). The tumor extended all along the *tongue* so that its origin could not be appreciated. On its surface it was dermoid, with hair and tallow follicles, and consisted of fat, cellular tissue, and blood-vessels.

J. Arnold (Virch. Arch., 1870, vol. 50, p. 482) reports a case of congenital compound lipoma of the *tongue and pharynx* perforating into the *cranial cavity*. It had a dermoid surface and contained particles of cartilage and masses of capillaries, detached during its development muscular fibres and layers of the tongue, closed the excretory duct of the sublingual gland, thereby caused the occurrence of cavities, fistulæ and pouches, and atrophied the glandular structure. Such at least is what the author

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claims; though the suspicion that the case is one of epignathus cannot be entirely suppressed.

F. J. Voigtel describes (Meckel's Hand-book of Path. Anat., Vol. I., p. 86), a congenital lipoma of the *dorsal and lumbar region*. The mass grew to the twentieth year and had at that time a circumference of thirty-six inches, and a weight of from three to four pounds. It consisted of several parts, all of which were capsulated.

Ph. von Walther's celebrated case of "*nævus lipomatodes*" is contained in his monograph (über d. angeb. Fetthautgeschwülste u. and Bildungsfehler, Landshut, 1814). The skin from the *third dorsal vertebra all over the back down to the nates, over thighs, abdomen* and upwards to the *mammæ* was of a brownish color, as frequently in *nævi* and covered with hair. On this surface there were twenty-four lipomata, large and small. The largest was located on *sacrum, right hip and thigh*. It was 19 inches in circumference, 18 inches long, 16 inches in its greatest breadth, and had a weight of from 16 to 18 pounds. Such it was when the girl was nineteen years old. When she was seven, it was not larger than a fist. Several operations were performed to reduce the size of the patient to more comfortable limits. When they had proved successful the girl, then but fifty-one inches high, but otherwise well built, grew and developed more normally.

C. Vogt (Einige seltene Congenitale Lipome, Diss. Berlin, 1876), publishes a few cases of congenital lipoma observed in the surgical clinic of the University of Berlin. One case was that of a girl a year old, who, according to the report of the mother, had been perfectly well up to half a year before. At that time, without any perceptible cause, there became visible in the *right mammary region* a movable tumor. The mother was certain that she had not noticed it at birth. For half a year the tumor had grown rapidly, and the patient was admitted on the 7th of July, 1876. The tumor covered almost all of the right anterior and a portion of the left side of the thorax. It commenced an inch and a half below the right clavicle, extended downward to the base of the ensiform process, and reached beyond the left margin of the sternum for

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about an inch and a half. It was three centimeters high, twelve centimeters wide, and nine long, and a circumference of about fifteen and a half centimeters. The surface exhibited a large number of dilated veins, and could be raised from the tumor with facility. The tumor was without pain, of soft consistence, and lobulated. Percussion and auscultation showed that the heart and left lung were pressed sideways and back. Thus the diagnosis of a tumor was made, located in the mediastinal cavity. It could not be stated, however, whether the two tumors, one outside, and the other inside, were connected with each other. The external tumor growing very fast, extirpation was proceeded with on the 12th of July.

It was found that the external tumor could not be removed entire, but that there was a process at its posterior surface which entered the third intercostal space about one centimeter from the right edge of the sternum. This process evidently was a pedicle protruding from the *mediastinal cavity*. Thus the substernal part of the tumor could not be extirpated, and the external portion only was removed. The child died eight days afterward of dyspnoea and erysipelas. The mediastinal tumor was found to be spherical, of the size of the fist, and surrounded by a very firm membrane, consisting of cellular tissue. Upwards and to the right there were two prominences of the size of a cherry. The tumor filled the whole of the anterior mediastinal space, was ten centimeters in length and extended from the manubrium sterni to the ensiform process. Its thickness was eight and a half centimeters, its width eleven. The case is plainly one that originated in intra-uterine life. It was observed only when the substernal portion found an outlet through an intercostal space. The large volume of the tumor and the generally slow growth of lipoma, militate against the assumption that it could be extra-uterine.

Another case reported by C. Vogt, is one in which the tumor was attached to the *common jugular vein*. A male child, from Cincinnati, healthy, vigorous, normal, showed immediately after birth an anomaly resembling a naevus on the neck. It grew very fast, and developed into a tu-

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mor. It was examined first on the 12th of June, 1865; on that day the anterior portion of the neck was covered with a tumor resembling a large goitre; it was of the size of the fist, extended from the left acromio-clavicular articulation to the right side of the trachea, thereby covering the trachea, larynx and jugular, and the whole of the part between the lower jaw and the clavicle. A month afterward it was extirpated and the lipoma was found to be located on the wall of the common jugular vein, from which it had originated.

Another lipoma reported by him is that which was extirpated from the *cervical regions* of a boy of twelve years. He had a small tumor in that neighborhood when born; it grew very slowly but constantly, and had reached the size of the fist when he was admitted; it was painless, soft, but little movable. The diagnosis was verified by the result of the operation.

When I was a student in the University of Bonn, Professor Wutzer operated on a tumor located on the *neck* of a girl four and a half years old. The report, by C. O. Weber, is found in Müller's Archiv., 1851. It was a mixture of teleangiectasia, lipoma and fibroma.

Dr. C. Hilton Fagge (Pathol. Trans., 1874, Vol. XXV., p. 268) reports fatty tumors from the posterior *triangle of the neck* (and a goitrous thyroid body), from a case of sporadic cretinism. In the upper part of the right lobe of the thyroid body was a rounded tumor the size of a walnut, lying deeply beneath the sterno-thyroid muscle. The tumors outside the sterno-thyroid muscle were found to be soft, well-defined masses; looking like fat, but distinctly differing in color from the subcutaneous fat in their neighborhood. For whereas the fat generally was of a suety whitish-yellow character, these tumors were more of a pinkish hue. On the left side the swelling overlapped the clavicle; on the right side it did not appear to do so, but there was an accessory mass, the size of an almond, projecting forward between two distinct portions of the sterno-mastoid muscle. Below the clavicle on each side there were somewhat similar masses lying beneath the pectoralis major, between it and the pectoralis minor.

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These differed less in appearance from the subcutaneous fat. On the right side the mass in question sent a smooth well-defined process forwards between the fasciculi of the pectoralis major.

This case is one of four of sporadic cretinism related by the same author in Vol. LIV. of the Med. Chir. Trans. In each of these fatty tumors were found, either large or small, goitre being present or absent, in the *posterior triangle of the neck*. Their exterior he considers the only constant distinction between sporadic and endemic cretinism.

R. W. Parker (*Obst. Jour. Gr. Brit. and Ireland*, vol. VIII., p. 659), removed a fatty tumor from the *neck* of a child. It had no capsule at all, was directly continuous with the subcutaneous fat, of unusually white color and delicate consistency. It grew but slowly, as this class of tumors always will do.

P. Vogt (*Die Chirurg. Krankh. der oberen Exh.*, 1881, p. 133, in Billroth u. Lücke *Deutsche chir.*, fasc. 64), says that the diffuse lipomatosis of the *vola manus* is not the only form of lipoma found in that neighborhood. There are genuine lipomata to be found circumscribed and with slow growth. Where they were congenital, or at least observed during infancy or childhood, they would cease to grow when the development of the body was completed. P. Vogt saw two cases of congenital lipoma, rather diffuse, on the *thumb* without any simultaneous hypertrophy of other tissues. Küster operated several times upon a boy four years of age, for a lipoma extending from the under side of the *fifth finger* to the *elbow*, until he finally succeeded in extirpating it. Trélat and Boinet met each with a lipoma in the *vola manus*, which were taken for hygroma of a tendon. In some cases there was a sense of fluctuation, even crepitation. Volkmann met with one which was transparent. Ranke removed two, one from the *vola* of the *fourth finger*, one from the *thumb*.

F. A. von Ammon (*Die Angeb. Chir. Krankh. d. Menschen*, Berlin, 1842, p. 136), describes, and draws on plate XXXII. of his atlas, a lipoma complicated with *nævus* on the *arm* of a child. It was extirpated. The cutis was

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in part degenerated, in part uneven, with solid prominences, some of which were of almost cartilaginous consistency. They contained fat and were covered with hair. A similar tumor (p. 135, the same plate) was removed from the *cheek* of a young man.

Aschoff (Monatssch. f. Geb. XXX., 1867, p. 199), described the case of a boy of three years with a lipoma of the size of the fist under the *right axilla*. The *fifth finger* on the right hand showed the following anomalies: it was very big and long, and abnormally movable. Its extension was perfectly free, perhaps too much so. Flexion, however, was impossible, rendered so by thick deposits of fat of the size of the finger. The anterior portion of finger exhibited such an amount of fat that it surpassed all the rest in length. There were no such abnormal deposits of fat on the dorsum, but they extended up to the elbow on the volar and ulnar side. All these anomalies were congenital.

W. Busch (Arch. f. Klin. Chir. VIII., 1865, p. 174), reports the case of a girl of twelve years, with hypertrophy of the *webbed second and third toes* of the right foot and lipomatous degeneration of the adipose tissue. On both the plantar and dorsal side the latter was an inch in thickness.

He also reports the case of a man of twenty whose foot had to be amputated because of hypertrophy (mostly osseous) of the *first three toes* of the left foot. The lipoma was both diffuse and localized. Fat was in close connection with the skin. The latter was thin in several places, perhaps atrophied by the pressure from inside; in others it was thicker, and the fat imbedded in fibrous masses. The softer lipomata in the interior forced their way between the bones. These were isolated lipomata of the *dorsum pedis* surrounded by a network of largely dilated veins.

In both of these cases the lipomatous degeneration formed part of the general gigantic growth. Lipomata when congenital, may occur on both the exterior and flexor side of the extremities, but favor the latter. This is contrary to what is observed in advanced life, when lipomata never

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originate on the volar aspect of the hand or the plantar side of the foot.

L. Rose describes (Mon. f. Geb. XXX., 1879, p. 342) the body of a child that died when a year old, with remarkable enlargement of the *two lower extremities*. The increase in size was due to both a lipomatous and a fibromatous degeneration, together with tangiectatic anomalies. The two former excluded each other; they were found in different localities. Most of the lipomatous degeneration was found to be on the flexor side and diffuse to such a degree that, microscopically, it could be compared with the soft forms of elephantiasis.

Of 73 cases of lipoma observed by Billroth in the clinical hospitals of Zurich and Vienna, one was congenital. It was located on the *dorsal side* of the *foot* of a male child (Th. Billroth Chirurg. Klinik., etc., Berlin, 1879, p. 581). Two other observations from Billroth's clinic were published by Wittelshoefer (Arch. f. Klin. Chirurg., XXVI., p. 57). Kessler and Annandale have similar cases. S. C. Busey (*Amer. Jour. Obst.*, Feb., 1877) has a number of very interesting observations belonging to our subject in his admirable essay on "Congenital Occlusion and Dilatation of Lymph Channels." The whole literature of this special subject of hypertrophy of the extremities is collected by F. Ahlfeld (*Die Missbildungen des Menschen*, Leipzig, 1880, p. 139).

The fourth case of C. Vogt's was that of a boy of three years, who on the 11th of May, 1876, exhibited a spherical, not lobulated, tumor of the size of a cherry on the dorsum of the second phalanx of the *index finger*. It had its seat in the subcutaneous cellular tissue, and was easy to extirpate. A lipoma of the *sole of the foot* has been related by Chevallier (Soc. Anat. Bord. II.) and a *congenital calcified lipoma* by L. Briolle (*Gaz. Hôp.*, Jan. 23, 1883).

He extirpated it from the gluteal region of a woman of thirty-five years, October 19th, 1882. When she was born there was a small tumor in the median line of the sacrum. It was believed to be a spina bifida until it grew and exhibited no other symptoms of that congenital anomaly. In 1882 the tumor extended 47 centimeters from

the left spina anterior superior over the left and right gluteal regions. Its height and depth were 25 centimeters. The surface was normal, a few dilated veins were observed, but the most remarkable part of the tumor were three distinct masses of evidently osseous nature. It weighed 5540 grammes; when removed it was found that there was no capsule, no cavity, no anatomical complications with the exception of three cretaceous masses which while forming one-quarter of the volume, amounted to three-fourths of the weight of the whole mass.

Ideler (*De lipomatibus congenitis adj. casus sing. descriptione*. Diss. Berlin, 1855), reports the case of a boy of twelve years, who exhibited a large lipoma in the gluteal region and several small ones on the left leg. Besides there were immense deposits of fat on both feet, mostly in the left plantar and dorsal regions. On both feet the three middle toes were webbed. All these anomalies had been observed at birth.

Henry J. Butlin (*Pathol. Trans.*, 1877, vol. XXVIII., p. 221), removed a fatty tumor containing striated muscular fibres, from a child aged seven years. It had been first noticed when the child was a year old—about the time she began to walk. Its growth for several years had been slow, but during the last few months its increase in size had been more rapid. It occupied the upper and back part of the *right leg*, a little below the knee, was circumscribed and enclosed in a thick capsule, passed between the tibia and fibula, pressing them apart and thrusting the interosseous membrane in front of it. It lay in a deep layer of muscles some of which were removed here and there with the tumor. The fact that there were striated muscular fibres in the tumor, the facility of overlooking the tumor when the infant was young and did not attempt to walk, its slow growth in the first few years, its location on the flexor side of the limb, are as many proofs for its having been congenital.

Mr. Athol Johnson has recorded a case of fatty tumor growing congenitally out of the *sacral canal* (*Trans. Path. Society*, Vol. VIII., p. 16-28).

Mr. Gay has related a case of congenital fatty tumor in

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the *sole of the foot* in which part of the foot was amputated under the belief that the neoplasm was malignant. (Path. Trans., XIV., p. 243.)

Th. Holmes (Surg. Treatment of the Dis. of Inf. and Childhood, London, 1868, p. 31), reports the case of fatty tumor of the *neck* of very large size passing into the *axilla* and lying in close apposition to the *subclavian vessels* in a girl of ten years: it is true the tumor had not been noticed by the parents until the child was ten months old. He also has the case of a fibro-fatty tumor of the neck attached to the spine in a male infant of three years, of uncertain duration. In this case also the mother asserted it was not congenital. (l. c. chap. XXI.)

Simon Duplay (Arch. Gén. 6, Sér. XII., p. 723, 1868), refers to a lipoma in the *coccygeal region*. It is of very rare occurrence. It is attached to the end of the coccyx or to its anterior surface. Besides, tail-like neoplasms are found in this neighborhood, either osseous or soft. They are at the lower point of the bone; the former are supplementary vertebræ, the latter consist of fat.

Of a similar nature appears to have been the case of Faber's mentioned by Ammon (l. c. p. 46).

Suttina removed a lipoma 330 grammes in weight, from the *lumbo-sacral region* of a girl twenty months old. It was of the size of a bean, when it was first observed, the infant being then two months of age. Its centre was in the median line at the juncture of the lumbar and sacral vertebræ. It sloped in the direction of the right hip, was very soft, nodulated and movable, and easily raised, and grew very fast, contrary to what is generally noticed about a lipoma.

The collection of cases extending over nearly a century proves the rare occurrence of congenital lipoma. Every additional case must be considered welcome. It appears that the number of those which have come to my own notice is unusual in the experience of an individual observer.

What I emphasized in my introductory remarks appears to be confirmed by the cases as far as reviewed.

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Few of them were capsulated, most of them diffuse. Some of the patients had both diffuse and localized and capsulated lipomata. Many were uncomplicated; some were complicated with teleangiectasia, either superficial or deep-seated, or with dermoid degeneration, or fibroma, or the formation of bone or cartilage, or calcification. The most interesting and dangerous complication was that with spina bifida—in my case.

The shape of congenital lipoma is frequently irregular, not spheroid as it is in the adult. This difference is the result of its uncapsulated, diffuse nature. Processes and protuberances are not infrequent, and apt to interfere with complete extirpation.

Its locality varies. Cases have been found all over the body. There is but a single case of lipoma of the head, but a goodly array of those on the back and particularly the lumbar and gluteal regions. Many are found on the extremities; the hands, and still more the feet, yield the largest number. Few of these, however, are uncomplicated; very few of them but are found on the palmar or plantar side, where the acquired lipoma of advanced age is not found.

SARCOMA IN A CHILD'S SKULL

IN W. Heineke's "Surgical Diseases of the Head (31st fascicle of Billroth und Lücke, *Deutsche Chirurgie*), 1882," we read as follows: "Sarcomata of the cranium have been observed in every period of life, but rarely in the first decade."

Henry Trentham Butlin ("Sarcoma and Carcinoma, their pathology, diagnosis, and treatment. London, 1882," p. 69), enumerates but three cases of sarcoma of the skull in children. One was in a female of four years. It was round-celled (*Pathol. Trans.* xxxi., p. 216, 1880), one—spindle-celled—in a boy of three years, (*Jahrb. d. Kinderheilk.* viii., p. 374, 1875), and the third—mixed-celled—in a boy of four years (*Virch. Arch.* lvii., p. 297, 1873).

F. Beely, in his essay on the diseases of the head in childhood, p. 57 (in C. Gerhardt *Handb. d. Kinderkrankh.* vol. vi., part ii.), has the following passage: "Not quite uncommon are malignant tumors on the skull of children. They exhibit a rapid growth and prevalence of cells and blood-vessels. Probably they are sarcomatous, though older authors and the English of to-day consider them carcinomatous. They originate either in the dura mater, or bone, or integuments."

The cases being so very rare, the following will be found interesting:

Thomas C., æt. 3 years and 9 months. His mother was healthy, and had borne five children in twelve years. His father was a drunkard and died of erysipelas. The mother had five sisters and four brothers, all healthy. She had an aunt who died of a tumor. The first child of Thomas's mother died at the age of five years of a tumor under the arm, that had been operated upon, but had returned.

Thomas weighed four pounds when born, and had a healthy wet-nurse. His head, when quite young, was no-

ticed to be large, and it is reported that the doctor said he had "water on the brain." His head gradually diminished in size, in proportion, but he did not thrive. What little strength he may have had he soon lost. He began to walk when two years and six months old. He could say papa and mamma when three years old, but has not since added anything to his stock of words. He never asked for food, but when he was hungry he cried. He played but very little. In the autumn of 1878 a swelling appeared on his right parietal bone, near the coronal suture, about the size of a pea and grew rapidly. The child seemed sick, was restless, rolled about a great deal, pressed its hands upon its head, the feet became cold, still he did not *appear to suffer*, and his appetite remained good. His bowels were costive. When admitted, March 3, 1879, to my service in the Mount Sinai Hospital, N. Y., he was restless, irritable, and cried a great deal. He did not walk and wished to be carried about. He was unsocial, took no notice of the other children, did not wish to play, but ate and slept well. Heart and lungs normal. His general appearance was that of a stupid, idiotic child. The other children looked upon him as a stranger and as strange. The only sound he uttered besides his occasional crying was a loud long-drawn humming, frequently repeated when he was on his back and comfortable, a humming that attracted the attention of the children through the whole ward. During the first week in which he remained in the hospital the tumor grew very rapidly, increasing in size in the one week fully twenty-five per cent., reaching about the size of half a man's fist, not painful and rather elastic. A very obscure sensation of fluctuation was present, the tumor was not compressible, and the skin covering it was normal. The superficial veins were somewhat dilated. An exploring puncture brought a little blood.

March 11.—An operation was performed, consisting in making a long incision over the tumor, peeling off the skin, cutting through a dense membrane surrounding the tumor in the neighborhood of the cranium, peeling the tumor from the cranium (which was easily accomplished,

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as the attachment to the bone was only slight), until an irregular opening into the cranial cavity was reached, having a diameter of half or three-fourths of an inch.

Before the outer portion of the tumor was removed a pulsation was noticed near this opening into the cranial cavity. When it was lifted up and peeled off a little more, the portion inside the cranial cavity was broken into and four ounces of milk-and-coffee colored fluid escaped. The condition of the child during the first part of the operation was good, but towards the latter part the pulse became feeble, and, as it did not seem desirable to allow the liquid to escape from the cranial cavity at once, the operation was stopped, the external portion of the tumor removed, and the wound closed with a few long hair-lip needles. There was only slight hæmorrhage. At 7.45 P. M. of the day of the operation the boy was quiet, his feet were warm, his cheeks were rosy, the temperature was but slightly elevated, there was slight facial paralysis, ptosis on the right side. Also a slight degree of divergent strabismus, and he was pleasantly humming as usual.

March 12.—Right pupil dilated. When the dressing was changed two ounces of the same kind of liquid first discharged made its escape. The locality was thoroughly syringed with carbolic acid water. Before a new dressing was put on he vomited, and was comatose for a few minutes. The breathing was quiet and slow, and fifteen minutes afterwards he was again conscious, his pulse rallied and his pupils responded to light. Hummed for half hour in succession. 6.30 P. M.—Patient slept up to 2 P. M. Pupils slightly dilated. 11 P. M.—Slept well, but through the latter part of the night was restless and cried.

March 13.—Between 3 and 4 A. M. he cried a great deal and vomited often. Took milk and whiskey. 6 A. M.—Hands and feet cold; pupils slightly dilated; much discharge from cranial cavity. Carbolic acid, 50 per cent. solution, was applied to the intra-cranial portion of the pseudo-plasm through the opening in the cranium, and that within reach thoroughly destroyed.

March 14.—Patient's sleep was good. Pulse 160. Tongue furred. Hands and feet cold. Respiration 32. Chloro-

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form was given for the purpose of applying the 50 per cent. solution of carbolic acid, a portion of the intra-cranial tumor was removed, and also about a square inch of cranial bone which was thin and looked abnormal. 3 P. M.—He drank milk freely. His extremities were warm and he had had a passage from the bowels.

March 15.—General condition remained unchanged. Another small portion of bone was removed, and a loose portion of the intra-cranial tumor.

March 16.—Patient cried a great deal; was restless and cold; and there was a copious discharge from the opening in the cranial cavity. After the dressing was changed he was again quiet. 4 P. M.—A small portion of bone was removed and a large quantity of material belonging to the tumor. When the cavity was thoroughly cleansed there was brought into view a thick, whitish membrane, which pulsated under the finger. When pressure was made upon it a good deal of discharge took place from the right side. It was found that the whitish membrane was the dura mater, fastened to the brain, thickened, and changed in color. The brain showed no elasticity, and did not rise in the direction of the cranium. The intra-cranial surface from which the dura mater was removed was about four inches in length by two and a half in breadth.

March 17.—A small portion of abnormal looking bone was removed, and, immediately after the patient had a chill that lasted five minutes. 6 P. M.—Sufficient discharge had taken place from the opening to penetrate the dressing. 8.30 P. M.—Discharge from the cranial cavity copious.

March 18.—Pulse regular; extremities cold; crying a little; still humming for hours. 2 P. M.—Breathing rapid; 48 per minute; pulse imperceptible. Conjunctiva injected and anæsthetic. The dressings were changed, stimulants were given, hot bottles were applied to the feet, but he became blue, still hummed, then became unconscious and died at 3.10 P. M.

The microscopical examination of the tumor proved it to consist of spindle-shaped cells, and large masses of cellular tissue, the latter mainly in the outlying portions. The surrounding bone was partly in the same condition, much

SARCOMA IN A CHILD'S SKULL

material containing spindle-shaped cells being easily rubbed off. The thinness of the bone was principally due to compression by the tumor both from inside and outside. The dura mater exhibits strongly marked symptoms of a chronic inflammatory process. The fact, not even alluded to in a number of anatomical text-books, of the double composition of the dura mater, is beautifully evident. Two thickened layers can readily be distinguished and even separated. The change in the dura is mainly visible on the right side; falx and tentorium are less abnormal.



GASTROTOMY IN STRICTURE OF THE ŒSOPHAGUS

MATHILDA WEINBERG had seven children, the last twenty years ago, when she was thirty-two years old. All of her confinements were normal. She never suffered from her breasts while nursing. Her menstruation, during both her unmarried state and in the intervals between carrying and nursing her several infants, was regular and painless, until the age of nearly forty, when it suddenly ceased. About that period of her life she was taken ill, and suffered severely from headaches—to attacks of which she had been liable in former years—nervous prostration, hysterical attacks, and the symptoms of general hydræmia, for about nine months. Toward the close of this spell of sickness, she came under my notice. Emaciation, prostration, and hydræmia, were excessive; various hysterical symptoms intervened, such as globus, neuralgias, and œdematous swellings, so that it required removal from a dark and stifled tenement bedroom, good feeding, careful nursing, and constant encouragement, to enable her to trust her feet again. It was, when I saw her first, impossible to decide if, and which, local disease had initiated these severe symptoms more than half a year previously.

When her general health improved, her menses reappeared with some regularity. About this time, in 1861, she noticed a small, moderately hard, painless lump in her left breast, which gradually increased in size, until about the end of 1861, when I saw her again; the whole breast was then infiltrated with a hard mass, the surface being pretty smooth, the nipple retracted. The breast was removed about a year after the first appearance of the pseudoplasm; the wound healed kindly. Four months afterwards, small lumps appeared at and near the inner extremity of the cicatrix, which were also removed, and

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proved scirrhus. Six months after the second operation, a lump of the same nature developed in, and was after some time removed from, the right breast. And a year afterward, in the cicatrix of the left side, and in the axillary glands, new deposits took place, which were removed in the fourth operation for that purpose. As, meanwhile, the case has been running its course over four years, as, moreover, the general appearance of the patient, though thin, fleshless, and emaciated, had not much changed, I reported its history at a meeting of the Pathological Society, and, in presenting the specimen, requested that a special committee be appointed for its microscopical examination, there being no regular microscopical committee in existence at that time. The committee reported, and declared the neoplasm to be scirrhus. After that time, new lumps would appear in rapid succession in the whole length of the cicatrix, and in the surrounding cutis, of a more or less rapid growth, with discoloration, from the size of a pea to that of a child's fist, and from the normal color of the integument to a purplish hue or a brownish, grayish tint. In a number of them, superficial or deep ulcerations would take place, some with a very offensive smell, some bleeding profusely in intervals, very few of them painful, though irritated, and only when an attack of erysipelas would set in. She had erysipelas after her last two operations, and had been liable to it five or six times every year since, the first symptoms appearing, as a rule, in the neighborhood of a new ulceration; in some instances, however, over distant parts. Thus she had from ten to twelve attacks of erysipelas, extending over from five days to three weeks, up to the end of 1867, when numberless lumps of the above description covered the whole breadth of the chest horizontally, with a vertical range of from four to six inches. The use of the knife was dispensed with; lotions of chlorate of potassium, of carbolic acid with glycerin, and of subsulphate of iron, were used almost incessantly, according to the changing indications. Besides, during a great part of 1867, she took from four to eight grains of carbolic acid daily, without any perceptible effect. About the begin-

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ning of 1868 I commenced an electrolytic treatment, nearly all of which was directed and administered by Dr. H. Guleke. He attended her regularly from the 18th of March to the 24th of May, 1868, employing eight elements of the largest Stoehrer galvanic battery, one electrode being applied to the sternum, the other to the indurations. On the 10th of April the pain in the principal lumps, which had been on the increase for some time, had almost disappeared. The indurations became smaller and paler. No more hemorrhages. Ulcerations became smaller, the indurated edges softer. On May 24th, although meanwhile the treatment had to be interrupted because of a return of menstruation, and again by an attack of erysipelas, we noticed "complete cicatrization and almost complete disappearance of hardness in lumps and edges."

Still, this improvement was but temporary. The patient was so used to suffering, and so well pleased when life was just bearable, that under ordinary circumstances she would stay away for months, only to return now and then for advice, or the prescription of a medicine to be obtained at public expense.

During October, 1873, the patient noticed some difficulty in swallowing, and at times immediate return of ingesta into the mouth. The obstacle to this free passage she experienced just below the fauces. There was no nausea. When food reached the stomach, it occasioned no distress or vomiting, dysphagia was much relieved by the occasional introduction of bougies, even when they could not be passed through the whole length of the stricture. She would come to my office once or twice a week, until in February, 1874, her visits had to become daily, or almost daily. At that time the stricture, which I found about eight inches behind the teeth, on a level with and a little below the cricoid cartilage, became more narrow, incapacitating her completely for partaking of solid food. No stomach-tube being admitted, I resorted to the use of pointed French urethral bougies, of which No. 18 to No. 24 would readily pass. Meanwhile her appetite remained good, too good in fact for her difficulty

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in deglutition and suffering, while her bowels were rather constipated.

When she was admitted to the Mount Sinai Hospital, on April 8, 1874, she presented the above-mentioned appearance, with some additional enlargements of axillary lymphatic glands, another in the supra-clavicular region, and great emaciation and debility. Her viscera proved healthy. The uterus somewhat large. The treatment consisted, in the beginning, of the introduction of French bougies through the stricture twice daily, deodorizing applications to the scirrhus ulcerations of the breast, and the best possible liquid food.

On April 18th she was unable to swallow anything, but a catheter was readily passed, and milk poured into the œsophagus from a fountain-syringe. I emphasize the fact that the instrument through which the injection was made, or rather through which the food was poured, was a catheter of common size, which reached but a little distance below the stricture, and certainly not through the cardia. It *disproves* the assertion that the whole length of the œsophagus, with its pharyngeal insertion, is required for the starting of peristaltic motion, and that in cases of œsophagotomy the simple pouring in of liquids through the fistula—without the cardia being passed by the sound—must necessarily prove ineffective. On April 19th she recommenced to swallow in her former way. Still the incident of the day previous hastened my intention to relieve the patient from her imminent danger of starvation, and before her strength should be too much reduced. Thus, after consultation with the other members of the medical board, and in the presence of a number of medical gentlemen of the city, I proceeded to perform gastrotomy April 24th, at 3 p. m.

The patient was on her back, chest and head but slightly raised, and anæsthetized. The incision was commenced below and between the cartilaginous ends of the seventh and eighth ribs, and was carried through the skin and subcutaneous muscular tissues, vertically downward, about two and a half inches. Several small arteries had to be ligated, although the handle of the scalpel was employed

GASTROTOMY IN ŒSOPHAGEAL STRICTURE

more than the blade. Fascia transversalis and peritonæum having been divided, the omentum presented itself. Exploration by the finger exhibited the margin of the liver, the small curvature of the stomach, and pancreas, and inspection on pulling out the stomach, the venæ epiploicæ. Then a solution of bicarbonate of soda, followed by a solution of tartaric acid, was introduced into the stomach through a catheter passed beyond the stricture, for the purpose of inflating the stomach, of marking its outlines, and facilitating the incision through the anterior wall. The experiment, which had proved very successful a few days before, during my examination of the parts, failed to give satisfaction. Through the lower end of the opening into the peritonæum, about one and a half inch in length, I introduced a curved needle and silk ligature into and through the anterior wall of the stomach, which was held by pincers. It was thereby brought forward and held to the anterior wall of the abdomen. One and a quarter inch above this point the same proceeding was repeated, and between these fixed points the incision into the stomach was made, one inch in length. A little gas and very little mucous froth escaped, and an artery in the wall of the stomach was ligated. Eight silk ligatures were carried through the whole thickness of the stomach, about one-sixth or one-fourth of an inch from the incision, and through the external integument, sufficient to hold it in close juxtaposition and prevent any escape of fluids from the stomach into the abdominal cavity. Finally, a Carlsbad pin, and two silk ligatures besides, were used to close the external wound below the attachment of the stomach. Wet compress and bandage were applied, and, because of continued efforts at vomiting, a subcutaneous injection of sol. Magendie was made immediately after the operation.

At 5 P. M.—Pulse 70; extremities cool. Enema of two ounces of brandy-and-water.¹

¹ To avoid repeating, I state here that all food and quinine were given in an enema; morphine, when no contrary statement is made, subcutaneously, and the temperature was always taken in the vagina.

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6 P. M.—Pulse 82, temperature 96.7. Beef-tea $\bar{5}$ vj. Very quiet. No retching.

9 P. M.—Milk $\bar{5}$ vj, brandy $\bar{5}$ j.

10 P. M.—Pulse 80, temperature 98.8. Beef-tea $\bar{5}$ vj. Quiet. One slight effort to vomit.

April 25th, 2 A. M.—Pulse 90, temperature 98.8. Food, morph. gr. $\frac{1}{6}$. Quiet through the night.

6 A. M.—Pulse 90, temperature 100. Vomited some frothy fluid; severe retching. Morph. gr. $\frac{1}{6}$; either beef-tea or milk $\bar{5}$ vj every two hours.

10 A. M.—Pulse 106, temperature 101.8. Nausea, thirst; ice-water with brandy in small quantities by the mouth. Bisulphat. quin. gr. x, and food retained.

11 A. M.—Morph. gr. $\frac{1}{6}$.

2.30 P. M.—Pulse 100, temperature 101.4. Slight dullness, on percussion from wound downward to the left, in hypochondriac and lumbar regions.

4 P. M.—Bisulphat. quin. grs. x. Some abdominal pain; cannot pass urine.

6 P. M.—Pulse 96, weak; temperature 101.2. Some straining sensation, but no evacuation from bowels; tenderness in left hypochondrium; ice-bladder.

8 P. M.—Bisulphat. quin. grs. x.

10 P. M.—Pulse 84, temperature 100.2. Vomited, once during the evening, about four ounces of brownish fluid. Morph. gr. $\frac{1}{10}$. About $\bar{5}$ ij of brandy used in the milk injections through the day.

12 M.—Slept since 10 P. M. Retching again. Morph. gr. $\frac{1}{10}$.

26th, 2 A. M.—Pulse 84, temperature 99.6.

4 A. M.—Vomited a little.

6 A. M.—Pulse 92, temperature 100.4. Tongue dry, sleeps much; nausea as soon as the effect of morphia passes off; considerable infiltration of abdominal wall to left of wound, extending some distance posteriorly. Ice continued. Morphine gr. $\frac{1}{10}$.

8 A. M.—Bisulphat. quin. grs. x.

10 A. M.—Pulse 88, temperature 99.8. Nausea and retching. Morph. gr. $\frac{1}{10}$.

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2 P. M.—Pulse 90, temperature 100.2; pulse weak. Vomited once some greenish material.

3:30 P. M.—Morph. gr. $\frac{1}{10}$.

4 P. M.—Quin. bisulph. grs. x.

6 P. M.—Pulse 92, temperature 100.4.

8 P. M.—Quin. bisulph. grs. x., morph. gr. $\frac{1}{8}$.

10 P. M.—Pulse 100, small; temperature 99.6. Faint.

12 M.—Slight retching. Morph. gr. $\frac{1}{8}$.

27th, 2 A. M.—Pulse 92, temperature 99.8. Slept quietly. Bisulph. quin. grs. x.

4 A. M.—Morph. gr. $\frac{1}{8}$.

6 A. M.—Pulse 92, temperature 100. Nausea, tenesmus. Morph. gr. $\frac{1}{8}$.

10 A. M.—Pulse 98, temperature 100. Quin. bisulph. grs. x. Enema of Leube's meat solution (substituted henceforth for beef-tea) $\bar{3}$ j with water $\bar{3}$ iv, and alternated with milk $\bar{3}$ vj. Morph. gr. $\frac{1}{8}$. Tongue dry. Infiltration in left hypochondrium and lumbar region more extensive and marked; tenderness on pressure confined to this part of the abdomen, tympanites general, slight erysipelatous redness over abdomen, enemata retained, thirst. Acid muriat. in water, small quantities by mouth.

12 M.—Morph. gr. $\frac{1}{8}$ with beef-solution.

1 P. M.—Retching. Morph. gr. $\frac{1}{8}$.

3 P. M.—Pulse 90, temperature 99.8. Morph. gr. $\frac{1}{8}$, quin. grs. x.

7 P. M.—Pulse 100, temperature 100.2. Morph. gr. $\frac{1}{6}$.

10 P. M.—Pulse 96, temperature 100.7.

28th, 4 A. M.—Pulse 96, temperature 99. Quin. grs. x, morph. gr. $\frac{1}{8}$. Slept all night; some retching.

8 A. M.—Pulse 100, temperature 99.4. Quin. grs. x, morph. gr. $\frac{1}{8}$. Erysipelatous redness and infiltration extend posteriorly. Carlsbad pin and the two silk ligatures uniting the abdominal wound, also five of the eight silks from the fistula, removed.

2 P. M.—Morph. gr. $\frac{1}{6}$.

4 P. M.—Violent retching, soon relieved. Quin. grs. x, morph. gr. $\frac{1}{8}$ by enema.

6 P. M.—Pulse 78, temperature 99.3. Some pus can be

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pressed from the lower part of abdominal wound. Tympanites not quite so much; tongue moist.

10 P. M.—Pulse 80, temperature 98.8. Quin. grs. x, morph. gr. $\frac{1}{8}$.

29th, 1 A. M.—Morph. gr. $\frac{1}{6}$.

3 A. M.—Pulse 70, temperature 99. Sleeps quietly, head rather cool. Quin. grs. x.

5 A. M.—Morph. gr. $\frac{1}{6}$.

7 A. M.—Pulse 76, temperature 99. Morph. gr. $\frac{1}{6}$ in enema.

9 A. M.—Morph. gr. $\frac{1}{6}$.

11 A. M.—Quin. grs. x, morph. gr. $\frac{1}{8}$ in enema.

1 P. M.—Pulse 72, temperature 99. Morph. gr. $\frac{1}{10}$. Large evacuations of thin, yellow, fecal material, accompanied with escape of gas, odor very offensive; vomiting a little at the same time, no pain. The sensation of weight and tenesmus greatly relieved, tympanites less.

3 P. M.—Quin. grs. x, morph. gr. $\frac{1}{6}$ in enema.

5 P. M.—Pulse 68, temperature 99. Stomach washed out through fistula with a mild solution in water of bicarb. sod. Small quantity of Leube's meat-solution introduced through fistula. Morph. gr. $\frac{1}{6}$.

10 P. M.—Bowels moved again, same character of passages, a little vomiting.

11 P. M.—Morph. gr. $\frac{1}{6}$ in enema.

30th, 3 A. M.—Pulse 78, temperature 98.4. Tenesmus again. Quin. grs. x, morph. gr. $\frac{1}{6}$.

9 A. M.—Pulse 80, temperature 99. Quin. grs. x, morph. $\frac{1}{8}$ in enema. Erysipelas extends over the back, left side, and downward toward left thigh. Feels somewhat soft; elastic. Exploring needle brings no liquid.

3 P. M.—Pulse 96, temperature 102.3. Morph. gr. $\frac{1}{6}$ in enema at 1, now subcutaneously; bisulph. quin. grs. x.

5 P. M.—Pulse 100, temperature 102.9.

9 P. M.—Pulse 98, temperature 102. Bowels moved at 6 P. M. Faeces yellow, offensive. Morph. gr. $\frac{1}{6}$ at 6 P. M., at 10 P. M., at 11 P. M. Quin. grs. ex.

May 1st, 1 A. M.—Pulse 96, temperature 102. Bowels moved again. Morph. gr. $\frac{1}{6}$. Mouth very dry.

5 A. M.—Pulse 100, temperature 103.2. Evacuation

GASTROTOMY IN ŒSOPHAGEAL STRICTURE

of bowels. No tympanites. Quin. grs. x, morph. $\frac{1}{8}$ in enema.

8 A. M.—Pulse 100, temperature 102. Slight chills.

10 A. M.—Considerable puffiness, and some sensation of elasticity, or fluctuation, over left half of the abdomen and renal region. Two exploring punctures without result. Restless. Morph. gr. $\frac{1}{6}$.

5 P. M.—Pulse 88, temperature 102.7. Stomach washed out again; Leube into stomach, does not appear to be retained. Fluids taken by the mouth rush through fistula. Incision about four inches to the left of fistula through skin and muscle down to fascia transversalis. Some little hemorrhage. Discharge of pus partly thin and offensive, partly laudable. Injections of carbolic acid and water frequently repeated. Distinct communication of new incision with original wound, which meanwhile has reopened completely, and with fistula running upward and backward. Quin. grs. x, morph. gr. $\frac{1}{6}$.

2d, 2 A. M.—But little pus, not of bad quality; thirst.

6 A. M.—Pulse 94, temperature 101.3. Bowels moved.

8 A. M.—Quin. grs. x, morph. gr. $\frac{1}{8}$.

10 A. M.—Pulse 94, temperature 101.5.

12 M.—Morph. gr. $\frac{1}{6}$.

2 P. M.—Quin. grs. x.

5 P. M.—Since yesterday, in spite of reduction of temperature, and the complete retention, in the rectum, of the injected meat-solution and milk, the general condition of the patient is decidedly worse. Pulse small, features haggard, expression of collapse; skin cool, veins unusually visible. Transfusion of four or five ounces of defibrinated blood from the arm of the house-physician, Dr. Froelich, into the median basilic of the patient. No very visible effects, except on the features, which look less haggard.

6 P. M.—Pulse 100, temperature 103.8. Face has a cyanotic hue, respiration becomes labored.

8 P. M.—Temperature 106.3. Profuse perspiration, hands cold, mouth dry, pulse hardly perceptible. Consciousness unimpaired.

9 P. M.—After brandy-and-milk injection, pulse 108,

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temperature 104.5. Respiration labored and hurried, 48 a minute, extremities cold. Perspiration still profuse.

12 M.—Temperature 102.5, pulse perceptible, but cannot be counted.

3d, 2 A. M.—Quinine, grs. x, and beef-solution injected, but not retained—the first time they are expelled.

4 A. M.—Temperature 105, pulse could not be counted, great dyspnœa, consciousness intact. Enema of milk-and-brandy retained.

6 A. M.—Died very quietly.

The *post-mortem* examination could not be extended beyond the abdominal cavity. The blood-vessels of the mesentery and the peritonæum, especially of the left side, and particularly on intestine, greatly dilated, but no effusion, no liquid of any kind in the abdominal cavity, no adhesions whatever between any portion of the peritonæum, except around the wound of the abdominal wall and the fistula. The stomach was opened one inch and a half from the pylorus, midway between the small and large curvature; closely attached and adhering over a surface from a quarter to half an inch, to the peritonæum of the abdominal wall. Two tiers of fistulous openings extended from the original wound to the left, in the direction of, and beyond the counter-opening at the side of the abdomen; one in the subcutaneous tissue, the other between muscles and transversalis.

As epicritical remarks, I should offer the following: The operation was not a difficult one to perform.

The patient, it is true, had been sick for a very long time, thirteen years, but had always shown and again exhibited a wonderful vitality.

She was not reduced to such a degree as many of the other fourteen cases which I shall have to mention. Thus she had fair chances, not to outlive her sickness, but to enjoy the taking and assimilation of food, and to die of gradual exhaustion, rather than of hunger and thirst.

The first days after the operation were favorable. Little fever, moderate erysipelas, both passing by.

Rectum in excellent condition, every injection being retained.

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On and after the sixth day a new fever, from purulent infiltration of subcutaneous and muscular tissue, commencing, no doubt, in the original wound.

The impaired condition dates from that fact and that day.

Could septicæmia have been prevented? Possibly. I have remarked that the handle of the scalpel was used more than the knife in penetrating the tissues outside the fascia transversalis. This is safer, as far as hæmorrhage is concerned, but it may tear more tissue than a knife cuts, and thereby the possibility of infiltration may be enhanced. This, however, is not all. I believe it doubtful if carbolic-acid applications from the beginning would have prevented untoward occurrences; but what is hardly doubtful to me is that the firm closure of the external wound has proved injurious. I mentioned that for that purpose I employed a Carlsbad pin and two sutures besides, which were removed on the fifth day. Below this firm cover, through which liquids could not escape, serum, or drops of liquid running down from the stomach, would decompose and give rise to all the dangers described above. Besides, the mass of the stomach, sewed fast in the longitudinal straight wound of the abdominal wall, caused the abdominal wall, particularly the peritonæum and the skin, to be thrown up in a fold, again facilitating irregularities in the course of the healing process, giving rise to a little liquid being stowed away. Therefore, in my next operation, I propose to attach the stomach firmly all round the wound of the peritonæum and the corresponding portion of muscle and integument, but to leave the external wound open, and subject to antiseptic treatment.

I consider this point of great weight in the further development of this important operation; it may serve as a further illustration of the chances for good, lying hidden in every failure. The fourteen cases of gastrotomy performed for the same reason as mine—two French, one Danish, nine English, one German, and one American—yield a very interesting contribution to this subject. It is a brief history, and briefly told.

After John Watson and Ch. A. Egeberg (1839) and

others had already proposed gastrotomy for œsophageal stricture, Sedillot, professor in Strasbourg, presented, in July and November, 1843, to the Académie des Sciences of Paris two papers, in which he proposed that operation for the purpose of introducing food into the stomach in all those cases in which a stricture of the œsophagus rendered the normal introduction of food impossible. He insisted upon the fact that death was certain in all of these cases; that the patients, suffering from hunger and still more from thirst, were always anxious to undergo any operation undertaken in their interest. Leroy d'Étiolles introduced an ivory ring into an œsophageal stricture; it gave rise to such serious symptoms as to necessitate œsophagotomy. Taranget performed œsophagotomy for the same purpose, prolonging life about sixteen months. But even œsophagotomy is an impossibility whenever the stricture is located below the cricoid cartilage. Sedillot referred also to the success attending the experiments of Blondlot, who was the first to establish gastric fistulæ in the animal, and to those cases in which fistulæ of the stomach resulted from accidents, or from an operation undertaken for the purpose of removing foreign bodies.

His first operation² was performed on November 13, 1849, under chloroform, on a man of fifty-two years, who had suffered from stricture of the œsophagus for a year past. Incision crucial, under the ensiform process, to the left, through skin, subcutaneous tissue, muscle, fascia, and peritonæum. The stomach, after the omentum had been pushed aside, was drawn out and punctured. The aperture was filled with a tube consisting of two grooved halves armed with prominences destined to retain the stomach *in situ*. An elastic sound was introduced through this tube, and the whole apparatus fastened outside. The stomach was then replaced in the abdominal cavity, but sank to an unexpected distance, drawing the tube after it to a considerable extent. After some hours chicken-broth was injected, but part of it flowed out again. The patient slept till midnight, grew feverish, and died at 7 A. M. In the abdomen reddish serum, ecchymoses round the

² *Gazette de Strasbourg*, 1849, No. 12.

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wound of peritonæum, omentum slightly reddened and ecchymotic. Aperture of stomach near cardia also surrounded by ecchymoses; two hundred grammes of a greenish liquid in the stomach. On a level with the sixth rib there was an epithelioma of the œsophagus, causing the stricture.

In regard to the cause of death, the opinions differed greatly. The influence of chloroform, the debility of the patient, compression of the pneumogastric nerve in the tumor, the entrance of air into the abdominal cavity, were equally held responsible. Besides, Sedillot resolved to improve the method of operating in two points: firstly, by sewing the stomach to the integuments; secondly, by avoiding injections into the stomach.

He performed his second operation, January 20, 1853, on a man of fifty-eight years.³ Incision as in his first case. The stomach was drawn out by means of pincers, and six sutures introduced through peritoneal and muscular layers of the stomach, and attached to the integuments, so that the stomach covered the wound from inside. The stomach was not to be opened until sufficient adhesions between the two peritoneal layers had formed. An hour afterward the patient had a severe attack of coughing, part of the sutures tore through, and the stomach escaped. Sedillot drew it out again and held it to the abdominal wall with his pincers, which were tightly closed. Next day, fever, inflammation of the wound, and diarrhœa. Leeches, injections of opium into the rectum, and leeches again. On January 25th, gangrene round the wound, pin-cettes and sutures removed, adhesions formed. A greenish fluid flowed out of the stomach; abdomen not large nor painful. Wine and beef-broth injections into the stomach, through a tube closed by a cork. Fever on the 27th, filiform pulse and chills on the 28th. Death on the 30th. There were pus in the abdominal cavity, and recent adhesions between omentum and intestines. Stomach firmly adhering to the peritonæum of the abdominal wall. The aperture two centimetres wide, one long, in the centre of

³ *Gazette de Strasbourg*, 1853, No. 3; *Union Méd.* March 31, 1853; *Gazette des Hôp.*, April 2 and 5, 1853.

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the anterior wall. Liver large, lungs adhering, old tubercles. Cancerous tumor in œsophagus, at and below sixth cervical vertebra.

E. Fenger's patient ⁴ was a man of fifty-five years. His premonitory symptoms had not lasted more than three months, the first being pain in deglutition. Ten days after the first symptoms he was unable to take solid food. The stricture, thirteen inches behind the teeth, was cancerous. No manifestations of the disease anywhere. Some infiltration (inflammatory) in the aspicæ of both lungs. The operation was performed under chloroform, March 23, 1853. The incision was made from the point of sternum downward and to the left, along the margin of the costal cartilage. On the same day oatmeal-gruel, and some time after milk, were poured into the stomach through a funnel; death after fifty-eight hours. At the *post-mortem* examination close attachment, but no adhesion, was found between the stomach and abdominal wall. Very little peritonitis. The aperture was two and a half inches from the cardia to the right, near the large curvature.

J. Cooper Forster operated twice. His first case ⁵ was a man of forty-seven years, who suffered from epithelioma of the œsophagus, about the level of the manubrium sterni, and was first subjected to tracheotomy, which did not relieve his dyspnœa, and to gastrotomy, on March 26, 1856. He died near the end of the second day. No peritonitis. Tubercles and emphysema in the lung.

His second operation ⁶ was on a boy of four years and four months, for corrosive cicatrization. It was performed, in 1859, under chloroform. He was fed with milk, eggs, and wine hourly, and died on the fourth day, of recent peritonitis. Although the aperture was not too near the cardia the sutures had torn through, and foreign substances were found in the abdomen.

Sidney Jones's first case ⁷ was a woman of forty-four

⁴ *Virchow's Archiv*, vi., 1854.

⁵ S. O. Habershon in "Guy's Hospital Reports," third series, iv., 1858.

⁶ "Guy's Hospital Reports," third series, v., 1859.

⁷ "Transactions Pathological Society," xi.

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years. Deglutition and breathing had been difficult since July, 1858; tracheotomy was performed on February 10, 1859; in May an elastic tube of No. 12 could no longer be passed; no food entered the stomach after the beginning of June, so that she was fed by enemata for five or six weeks. Gastrotomy was performed on July 14, 1859. The incision was vertical downward from the cartilage between the eighth and ninth ribs, the stomach fastened by five or six silk ligatures; milk-and-brandy were introduced into the stomach every two hours, and a good deal of retching experienced. She died thirty-six hours after operation. Aperture midway between pyloric and cardiac ends, and between small and large curvatures. Stomach adherent to abdominal wall. No peritonitis. The only cancerous deposit found in the body was from the pharynx down to the cricoid cartilage.

He also operated ⁸ on a man of sixty-one years, whose first symptoms—dysphagia and vomiting—dated from the 20th of May, 1866, and in whom the sound did not pass the cardia on the 22d of September.

After the operation, brandy, egg, and milk were introduced into the stomach directly through a tube which was not left in the stomach, but introduced for that purpose every two hours, or a little less frequently, after the fifth day. Beef-tea was added after some time. Pulse ranged for a long time from 60-70, temperature from 98-100. Two of his sutures were removed on the 1st of October; some pus followed their removal. He died on the 3d, or the eleventh day, of pneumonia; gray hepatization being found in the right lower, red hepatization in the left lower lobe. Opposite the first and second dorsal vertebræ was a hard tumor, scirrhus and encephaloid, involving the wall of the œsophagus and encroaching upon, but not ulcerating, the mucous membrane. The canal very narrow and tortuous. In the left kidney an encephaloid deposit.

Curling's case ⁹ was in a man of fifty-seven years, who had suffered but four weeks when admitted on January 30, 1866. Emaciation rapid. Operation March 31, 1866, under ether. Incision three inches long, vertically down-

⁸ *Lancet*, Dec. 15, 1866. ⁹ "The London Hospital Reports," iii.

ward from the end of the seventh rib. Stomach fastened with five stout silk sutures. Milk was injected after the operation, and gave pain which required morphia. Enemata were retained; no vomiting. Death after thirty-two hours, of exhaustion. Opening on great curvature close to cardiac end. One of the upper sutures had ulcerated out. Tissues around the incision discolored, blood extravasated into them. The tumor was an epithelioma which approached to colloid in the deeper layers, six inches below glottis. Besides, there were emphysema, fatty heart, atheromatous aorta and arteries, soft muscles.

Von Thaden's patient¹⁰ was a woman of fifty-four years, suffering from epithelioma, located about two inches above the cardia. Dysphagia had lasted a year, vomiting after some time, no pain. Injections of food into the rectum did not sustain her. Operation (1867) under chloroform. Incision three inches long, from the ensiform process downward and to the left, near the margin of cartilages. Three arteries were ligated; four sutures fastened the stomach to the lower angle of wound. The upper portion of external wound was united by nine sutures; the incision into the stomach, however, postponed till the next morning. After the operation, pain, in spite of morphia, and vomiting of acid fluids. Abdomen sunk, wound drawn in, funnel-like. The stomach was finally drawn up by the sutures and incised, the mucous membrane fastened by two sutures. Injections of beef-broth through a thin elastic catheter, repeated several times. No pain. Next morning two movements of the bowels. Temperature elevated; pulse accelerated; death forty-seven hours after the operation. The inner opening of stomach was but of the size of a pea, near the pylorus. Very little peritonitis, and only near the wound.

Francis Troup's¹¹ patient was a man of fifty years. The preceding symptoms were loss of appetite, gnawing pain, dysphagia, vomiting, thirst; the stricture resulted

¹⁰ Scharffenberg: "Dissertatio inauguralis de gastrotomia propter œsophagi stenosis instituta," Kilia, 1867.—Schmidt's Jahrb., 136.

¹¹ *Edinburgh Medical Journal*, July, 1872.

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from the presence of an epitheliomatous mass at the cardiac end. He operated (1867) by a straight incision, three inches long, midway between middle line and costal cartilage, and inserted a tracheotomy-tube, through which milk and stimulants were introduced for three days—death on the fourth. The opening was found in the middle of the anterior wall of stomach. Adhesion partially perfect. No peritonitis.

Durham's case ¹² was in a man of seventy years, without any hereditary disposition, suffering from an epithelioma above the level of bifurcation, with a slit-like ulceration into the trachea. He was admitted August 19, 1868, after having had a constant desire to expectorate for many months, and vomiting since June. After September 10th he swallowed nothing, and the operation was performed on the 15th. Incision of three inches from the cartilage of eighth and ninth ribs, so that the outer border of the rectus muscle was just seen. The opening was near the large curvature, and near the cardia, the stomach fastened with silk. On incising, and in introducing milk into the stomach, a dragging pain was experienced. Death, sixteen hours after operation.

Maury's patient ¹³ was a man of twenty-five years, with a history of indurated chancre and buboes at the age of seventeen years. On the 17th of May, 1868, he was suddenly seized with a choking sensation and a violent fit of vomiting. These paroxysms soon returned almost daily. In July a stricture was discovered near the cardiac orifice. A sound could be passed but once. No pain. In April, 1869, confined to bed through weakness; rallied after a few weeks, but again sank. Could not swallow anything about the middle of May, and was sustained by beef-extract and milk-punch injections, which were mostly retained. Complains more of hunger than of thirst. Operation June 25, 1869, under chloroform. Incision curvilinear, convexity toward median line from sternal extremity of seventh intercostal space, down and outward for four

¹² "Guy's Hospital Reports," third series, xiv., 1869.

¹³ *American Journal of Medical Sciences*, April, 1870.

inches. Rectus muscle, fascia transversalis, and peritonæum having been divided, the stomach was incised near pylorus, and fastened with numerous silver sutures. A tube was inserted at once, and beef-tea frequently injected. He commenced to sink soon after the operation, and died after twelve hours. "There was a close, firm stricture of the œsophagus just within its cardiac orifice, which produced such complete obliteration of its calibre as scarcely to admit of the passage of a probe. No evidence of ulceration; stomach contracted, empty, and healthy. The opening made was about two inches from pyloric valve. No tension or strain upon the sutures. Microscopical examination revealed that much, that the tumor was probably not cancerous."

John Lowe¹⁴ operated on a woman, fifty-one years old, September 24, 1869. First symptoms observed two years before operation. A scirrhus tumor about cricoid cartilage and base of neck for nine months; no solid food for seven months. Chloroform dispensed with after trial. The incision was conical, one and a half inches long, two fingers' breadth to the inner side of the costal cartilage. Four silver sutures through the stomach, avoiding the peritonæum. Silver tube one and a half inches long introduced at once. After considerable relief, patient died suddenly on the third day. Wound looked healthy, integuments and stomach were united. No other inflammation. Serum $\frac{3}{4}$ iv in pericardium; heart fatty, soft; in the aorta a large, firm, colorless clot; the right auricle full of liquid blood. Death appears produced, therefore, not as Mr. Lowe thinks, "by the clot in aorta as the only assignable cause, due to prolonged fasting changing the blood, and shock of the operation," but to paralysis of the heart, between systole and diastole.

Bryant¹⁵ operated on a man with œsophageal stricture. He made an oblique incision along the lower border of the ribs, commencing at the linea semilunaris, with the view of catching the cardiac end of the stomach. He picked up the stomach with his fingers very readily. The patient

¹⁴ *Lancet*, July 22, 1871. ¹⁵ "Practice of Surgery," p. 293.

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lived five days; the operation had nothing to do with the death, and the local repair was most complete.

The fifteen cases reported or quoted by me are all the known cases of gastrotomy undertaken for the relief of stricture of the œsophagus. It being taken for granted that all the reasons for an operative proceeding are found correct, is not œsophagotomy an operation to be preferred to gastrotomy? When the stricture is at the very upper end of the œsophagus, not extending below the cricoid cartilage, the œsophagus might be opened, and the danger of peritonitis and the difficulties of after-treatment in gastrotomy avoided. Now, statistics prove but little, where the numbers are only small and the individual cases vary so much. Since the time of John Watson, who performed œsophagotomy in 1843, on a man twenty-four years old, for stricture of the œsophagus, with the result of keeping the patient alive for three months, the operation has been repeated a few times. De la Vacherie operated on a man, sixty-eight years old, in 1846. Death after five days. Von Bruns, on a man thirty-eight years old, for struma, in 1859. Death after ten days, from erosion of veins and pyæmia. On another man thirty-seven years old, in 1865; death after five weeks. Willet, on a woman, for carcinoma, in 1868; death after eighteen days. Billroth, on a man with carcinoma of œsophagus, and perforation of trachea; death after one day. Besides these six cases, I find three others quoted from Terrier (*"de l'Œsophagotomie Externe,"* Paris, 1870), one of which I have quoted above. They are said to have taken a much more favorable turn. One of the cases quoted by Taranget is said to have lived sixteen months, one three months, after the operation.

There is a very general objection to œsophagotomy, viz., the difficulty of its performance. Where the access from pharynx is very easy; where a Vacca instrument, or another "*Ektropœsophage*" can be introduced to guide the operator; where the general condition of the patient is good (as in the uncomplicated presence of a foreign body, for instance), the operation is a difficult one to perform, but may not offer insurmountable obstacles. But in cases

of stricture we have to deal with an œsophagus more or less inaccessible from above, thus lacking guidance from within, and in the very neighborhood of a pseudoplasm. The position of the œsophagus, between the vertebral column and larynx, muscles, vessels, etc., is confined in a narrow space, and changeable to but a small degree. As it has to be fastened to the integuments, a great deal of straining would be required. The neighborhood of the pseudoplasm, its intimate connection with the surrounding parts, will encumber the whole mass and render it less movable. The tissue of the œsophagus, where the incision will have to be made, may participate already in the process, or soon be implicated. For neoplasms will rest only when not irritated. Besides, the patient is feeble, emaciated, perhaps nearly dying, and unfit to undergo an operation of such severity as œsophagotomy.

On the other hand, wounds of the stomach are known to heal kindly. The celebrated cases reported in every text-book on physiology, and the thousand experiments since Blondlot's, on animals living with gastric fistulæ, are fair illustrations. One thing is certain, that human beings have lived many years with gastric fistulæ; which has not been proved yet in a case of œsophageal fistula. Peritonitis must be feared, but neither in my case, nor in others I have compared with mine, was it a dangerous feature. In many the direct statement is made that no peritonitis, or but little, was found; on the contrary, there are but two cases in which purulent peritonitis is asserted to be the cause of death; there is another with pyæmia, another with fatty heart and paralysis, one with extensive pneumonia, and a number in which the late hour at which the operation was performed and subsequent exhaustion were the direct causes of death.

The experience of our ovariologists goes also to show that the dangers of traumatic peritonitis have certainly not been underrated. Thus gastrotomy, being an operation which does not implicate large blood-vessels, and does not require an unusual degree of operative dexterity, is surely preferable. It is true that the results of the fifteen operations hitherto performed do not look encouraging. But

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they were, almost all of them, made in persons on the point of death, and with unripened experience. When you look over the number of cases here quoted, you find several points, in both operations and after-treatment, which our advanced knowledge upon abdominal wounds would hardly approve of. Thus, the first operator punctured the stomach, but did not fasten it by sutures; in his second case he did the latter, but did not puncture. When the sutures tore out in a violent coughing-spell, he fastened the stomach to the abdominal wall by means of pincers. Another, as late as 1866 (Von Thaden), employed sutures, and a puncture which was too small. Some made it a point to open the stomach near the fundus, the *curvatura major*, just the very portion which, in case of recovery, would be expected to attend to the greater part of gastric digestion. Some, like Durham, insist upon incising near the cardia. The aperture near the cardiac end must necessarily, after attachment at the abdominal wall is complete, give rise to straining and pulling. It is only in cases like that of Maury, who intentionally opened the stomach near the pylorus, that "tension and straining" are avoided. Besides, it is not always easy, it appears, to avoid an improper locality. Curling commenced his operation at the seventh rib in one case, anteriorly, and came out nearer the cardia than was desirable.

Other differences of proceeding appear in the after-treatment. When is adhesion to be expected? When are the sutures to be removed? Adhesive inflammation will not always set in at the same time in different individuals. The treatment itself may retard it; application of ice certainly will. Sidney Jones found adhesion in thirty-six hours in one case. In another he allowed the sutures to remain eight days, and met with suppuration in the stitches in consequence.

The mode of opening of integuments may not appear important enough to be here mentioned. Still it is not an indifferent matter whether, if the pyloric portion is to be opened—as it ought to be—the *linea semicircularis* is selected for the first incision (Durham, Forster in one case), or the rectus muscle a little farther to the left.

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Nor is it absolutely indifferent whether a longitudinal, or conical (Sedillot), or curvilinear (Maury) incision is made. Cutting through the axis of the muscle ought to be positively avoided.

Nor does it appear that the methods of the after-treatment, as far as feeding is concerned, have all been satisfactory. My case permitted of enlisting the services of the rectum to an unusual extent. Many operators have not even tried to render it serviceable. Maury states that feeding through the rectum proved insufficient in his case. It is an unfortunate fact that the strength of all the patients is so reduced as to weaken the sphincters. Only when operations shall in future be made in due time, before complete exhaustion has set in, will the feeding, for five or six days, through the rectum be feasible and effective. Only by sufficiency of the sphincters is it possible to explain the fact that Barlow could keep a patient on rectal injections exclusively for seventy days.

Instead of waiting a reasonable time before introducing food into the opened stomach, many operators have done so when the stitches had scarcely been applied. Forster fed every hour; in one case the sutures tore out. Some have fed through a funnel, some injected through a catheter (like Curling, who mentions pain as a constant result of every injection). Some allow the funnel to remain, another introduces it each time. I need not say that I prefer to rely on the rectum for some days, until I have reason to believe in adhesion of the two adjoining peritoneal surfaces being established. I should no more think, if I could help it, of exciting peristaltic motion in the stomach subjected to recent gastrotomy, than of administering a drastic in a common case of entero-peritonitis. As far as the selection of time for the operation is concerned, we shall not always have to decide that point. But, when the physician has any control over his patient and his case, he ought to operate in time. If Maury's case of malignant (probably syphilitic) stricture of the cardiac end of the œsophagus had been operated upon a few weeks previous to absolute exhaustion, it is not difficult to believe that he would not only not have died in a few hours after

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the operation, but might have been subjected to specific and sufficiently powerful treatment, the hyperplastic swelling have been reduced, the œsophagus reopened, the gastric fistula healed, and the patient be a well man to-day.

In view of all I have said, after I have spoken of its indications, difficulties, and promises, of its advantages over œsophagotomy, I need not again plead for gastrotomy as a justifiable operation. Colotomy has conquered its place in strictures of the lower, gastrotomy will obtain it in those of the upper portions of the digestive tract. It is, moreover, a peculiar feature common to both, that their diseases will run their course, usually, without many complications, or without metastatic processes. Besides, neither rectum nor œsophagus is a vital part. They are conveniences, not necessities; at all events, life can exist without them. Billroth has proposed the entire removal of a diseased portion of the œsophagus if accessible. It is true, many of us would rather lose life than either œsophagus or rectum; but not many of us would rather die violently of hunger and thirst than of slow and peaceful exhaustion. And patients suffering from œsophageal stricture are narrowed down to choosing between the two latter necessities.

Gastrotomy will hold a position similar to that of tracheotomy in point of dignity, but not in frequency of performance. The larynx is not a vital organ. It may be circumvented, as in croup or laryngeal pseudoplasm, by opening the trachea, or it may be removed altogether, as has been done by Billroth. It is not many years since we disclaimed the justifiability or necessity of tracheotomy in croup; to-day I know that very many of my youngest *confrères* not only defend tracheotomy as a necessary operation, but have even pronounced, long since, that every physician ought to know how to perform it *proprieis manibus*.

	Year of Operat'n.	Sex	Age	Disease.	Time of Death after Operation	Cause of Death, and Post- Mortem Appearances.	Where Reported.
1. Sedillot	1849	M.	52	Epithelioma of lower third of œsophagus.	Twenty-one hours.	Chloroform? Exhaustion? Moderate peritonitis.	"Traité Méd. Opér." il., 272. Gaz. de Stras- bourg, 12, 1849.
2. Sedillot	1853	M.	58	Cancer in lower third of œsophagus.	Tenth day.	Purulent peritonitis. Stomach firmly adhering.	Gaz. de Strasb., 3, 1853. Union Méd., March 31, 1853. Gaz. Hôp., April 2 and 5, 1853.
3. Fenger	1853	M.	55	Cancer in middle third of œsophagus, thirteen inches from teeth.	Fifty-eight hours.	Exhaustion. Little peri- tonitis; close attach- ment, but no adhesion as yet.	Virchow's Arch., vi., 1854.
4. Cooper Forster	1856	M.	47	Epithelioma of œsopha- gus.	Second day.	Exhaustion. No perito- nitis. Tubercles and emphys. in lungs.	S. O. Habershon, in Guy's Hosp. Rep., third se- ries, iv., 1858.
5. Cooper Forster	1859	M.	4	Corrosive stricture.	Fourth day.	Peritonitis. Sutures torn out. Foreign substances in abdominal cavity.	Guy's Hospital Reports, third series, v., 1859.
6. Sidney Jones	1859	F.	44	Scirrhus of phar. and œsoph. above cricoid cartilage.	Thirty-six hours.	Exhaustion. No perito- nitis.	Transactions of Patho- logical Society, xi.
7. Sidney Jones	1866	M.	61	Scirrhus of lower portion of œsoph. and cardia.	Eleven days.	Pneumonia. Gray hepat. right lung, red hepat. left lung. No perito- nitis. Stomach adher- ing. Encephaloid de- posit in left kidney.	Lancet, December 15, 1866.

	Year of Operat'n.	Sex	Age	Disease.	Time of Death after Operation	Cause of Death, and Post-Mortem Appearances.	Where Reported.
8. Curling	1866	M.	57	Epithelioma six inches below glottis.	Thirty-two hours.	Exhaustion. No peritonitis. Emphysema, fatty heart, and atheromatous aorta and arteries, soft muscles.	London Hospital reports.
9. Von Thaden	1867	F.		Cancerous stenosis of pharynx.	Forty-seven hours.	Exhaustion. Very little peritonitis, and only near the wound.	Scharffenberg. gastro-mia propter oesophagi stenosis instituta. Kiliae, 1867. Schmidt's Jahrb.
10. Durham	1868	M.	70	Epithelioma of middle third	Sixteen hrs.	Exhaustion.	Guy's Hos. Rep., 3d s., xiv., 1869.
11. Maury	1869	M.	25	Syphil. (?) strict. of cardia.	Twelve hrs.	Exhaustion.	Am. Jour. Med. Sc., April, 1870.
12. Lowe	1869	F.	51	Scirrhus of oesophagus and pharynx.	Third day.	Paralysis of heart. "Clot in aorta, and shock after operation."	Lancet, July 22, 1871.
13. Troup	1867	M.	50	Epithelioma of cardia.	Three days.	Paralysis of heart. No peritonitis; adhesion partial.	Edinburgh Medical Journal, July, 1872.
14. Bryant		M.	50	Stricture of oesophagus.	Five days.	No peritonitis.	"Practice of Surgery," p. 293.
15. Jacobi	1874	F.	52	Scirrhus of oesophagus above and level with cricoid cart.	Tenth day.	Septicæmia. No peritonitis.	New York Medical Journal, August and September, 1874.

PRIMARY SARCOMA OF THE FŒTAL AND INFANTILE KIDNEY

As late as eight years ago Klebs treated of carcinoma and sarcoma of the kidney under one head (*Handb. d. path. Anat.*, I., 1876, p. 598). He expressed the opinion that of renal sarcomata metastatic forms only were met with, and mainly the melanotic variety. J. Péan (*Diagn. et traitement des tumeurs de l'abdomen et du bassin*, I., 1880, p. 215) says: "The only tumors of the kidney deserving of our attention are of the malignant type. We shall describe them under the generic name of cancer." He does not mention sarcoma of the kidney either in the young or old. Robert (*On Urinary and Renal Diseases*, 1872) and A. d'Espine and C. Picet (*Man. prat. des mal. de l'enfance*, 3 ed., 1884, p. 698) treat of carcinoma and sarcoma of the kidney in the same chapter, the latter receiving no special notice. Ch. West (*Lectures*, 7th ed., 1884, p. 769) has nine instances of "malignant enlargement of kidneys" without distinguishing between carcinoma and sarcoma. Ebstein (*Ziemssen's Cyclop.*) thinks that sarcoma does not seem to occur in the kidney, and Birch-Hirschfeld (*Pathol. Anat.*, 1876) says that sarcoma in the kidney has been questioned by many, and is at all events of rare occurrence. In his masterly "*Lehrbuch der Kinderkrankheiten*," 4th ed., 1881, p. 556, C. Gerhardt, while compiling in his terse manner the most important data on renal carcinoma, has but a few remarks on "renal sarcoma." Not that he mistook one for the other, but because evidently the occurrence of sarcoma of the kidney in the young appeared to him so rare as not to justify its being treated in a separate chapter. Rindfleisch (*Die Elem. d. Pathol.*, 1883, p. 71) says literally: "In the kidney there is found genuine carcinoma only; it is just as apt to proliferate into the renal veins and the v. cava inferior

as the calices of the pelvis; thus giving rise to cancerous thrombosis in the former, and hemorrhages in the latter."

On the other hand it is very creditable to Lancereaux to differ pointedly from the above opinions, when he states (Dict. encyclop. d. sc. méd., 1876, art. Rein, p. 245) that a great many of the cases reported as cancer of the infant or child ought to be classed as embryonal fibroma, or sarcoma. Under this class he subsumes, for instance, the case of Van der Byl which attained a weight of thirty-one pounds (*Lancet*, Sept., 1856), also that of a female child who died in the service of Marc Sée in the Hospital St. Eugénie and unmistakably exhibited the histological elements of sarcoma ("fibrome embryonnaire globocellulaire"). The first brief monographic paper on sarcoma of the kidney in the young was written by Monti (Gerhardt's Handb. d. Kind., IV., 3, p. 449). He succeeded in collecting nine cases, a number which was increased to twelve by Neumann (D. Arch. f. klin. Med. XXX).

Finally, Eustace Smith (A practical treatise on disease in children, N. Y., 1884, p. 770) expresses himself as follows: "Tumors of the kidney are occasionally seen in children, and generally occur in the form either of a sarcomatous growth or of a hydronephrosis. Sarcoma of the kidney constitutes the ordinary form of renal cancer met with in the child. It occurs usually at an early age (the cases which have come under my notice have been all under three years old) and is usually confined to one side of the body. In the kidney, as in other organs, the growth often reaches a very large size. Sarcomatous tumors of the kidney generally grow rapidly, and the course of the disease is seldom protracted. Death often occurs within a year of the swelling being first discovered, and in the longest case life is rarely prolonged beyond eighteen months." The case he reports at some length is the same which has been published by H. A. Fotherby in *Brit. Med. Jour.*, Feb. 4th, 1882.

It is the purpose of this paper to prove that primary sarcoma of the kidney in the young is by no means so very rare as not to deserve more attention than it has hitherto found; and that it may even be found in the

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fœtus.¹ In regard to other organs the occurrence of the congenital and early sarcoma is already an established fact. Thus Hanns Chiari has the case of congenital myxosarcoma of the head, of the size of a man's fist (*Jahrbuch f. Kinderheilk. N. F. XIV.*, 1879, p. 230), and Kelburne King (*Lancet*, Nov. 27th, 1875) that of a congenital spindle-shaped sarcoma of the leg of an infant two months old, which, like that of Marshall's, was removed by amputation. The latter describes (*Lancet*, II., 1878, p. 545, *Trans. Pathol. Soc. London*, 1878, vol. 29) a spindle-shaped sarcoma in the muscles of the calf in a child aged five months which was noticed when the baby was but fourteen days old. The left calf measured twelve inches and a half in circumference to six inches and a half of the right. The tumor was found between the superficial and deep muscles, and rose probably from the fibrous tissue forming the deep fascia of the back of the leg. John H. Morgan has the case of sarcoma of the scapula in an infant followed by multiple sarcomata in various organs and tissues. It was first noticed when the infant was but four weeks old (*Trans. Path. Soc.*, 1879, vol. 30). M. Ramdohr (*Virchow's Arch.*, 1878, vol. 73, p. 459) has a case of congenital multiple angiosarcoma. In different parts of the skin there were twenty-two tumors, the largest on the chin, with fibrous degeneration of the lower jaw in the neighborhood of the tumor. The inguinal glands were affected, there were sixteen sarcomata in the internal organs, mainly in the lungs, and in the abdominal wall. The right kidney was seven centim. in length, the left six and a half. It was of bluish color, and almost entirely sarcomatous. In the different organs the sarcomata were found in different stages of development; in some they were very vascular, in some anæmic with much connective tissue, in others they were undergoing fatty degeneration.

A congenital sarcoma of the lower jaw has been reported by Arkövy (*Pr. Hetilap.*, Feb. 4, 1883, *N. Y. Med. Record*,

¹ In regard to carcinoma of the fœtal kidney A. d'Espine and A. Picot (*l. c.* p. 698) have this: "Le cancer des reins n'a pas été trouvé dans le fœtus." Such a case, however, has been presented by me before the Obstetrical Society of New York.

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March 31st, 1883). Two cases of a similar nature are found in Holmes (Surg. Dis. Children). B. F. Dawson has a congenital myxosarcoma of the right femur (*Amer. Jour. Obst.*, etc., Jan., 1879), Maas (Berl. klin. Woch., Nr. 47, 1880), one of the left axilla, originating in the glands and extending from the second to the seventh rib. He operated when the child was nine months old. Nélaton observed a fibroplastic tumor in a child three days old, and Virchow quotes, from Holmes and Bryant, some cases of sarcoma, and from Billroth that of myeloid sarcoma of the tibia, probably of congenital origin (A. Henoque in Dict. encyclop. d. sc. méd., 1879). A sarcoma of the right ovary is reported in the *St. Louis Courier of Medicine* (Aug., 1884) by Evers. It weighed twenty-eight pounds when the child died at the age of two years and a half. It was of solid consistency, and though the rapid enlargement of the mass took place during the last seven weeks only, was probably congenital. Finally, a case of congenital sarcoma of the tongue, thus far the only one on record, has been published by me in the *Amer. Jour. of Obst.*, etc., Aug., 1869.² [See page 93 of this volume.]

² This case has been made the subject of a peculiar criticism on the part of Henry Tventham Butlin (*Sarcoma and Carcinoma, their pathology, diagnosis and treatment*, London, 1882). He objects to its being accepted only because it is the only one on record. The several reasons why the nature of the tumor reported by me should be regarded with suspicion, "although its structure seems to have been undoubtedly sarcomatous," are as follows: 1st, the rarity of sarcoma as a congenital disease; 2nd, the fact that at present this appears to be the only sarcoma of the tongue on record (still the author refers to a case of Siedamgrotzky in Canstatt's *Jahresbericht*, 1873, p. 607, and another in the Museum of St. Bartholomew's Hospital, both from the tongue of a cow); 3rd, the absence of recurrence or of glandular affection; 4th, the probability that embryonic tissues such as this was composed of have not the same signification in a fœtus or a child so little removed from fœtal life as they have in older patients. Now the last named reason is hardly one at all. For if congenital sarcoma have not "the same significations" in the fœtus or infant which it has in the adult, it is still sarcoma. That it is comparatively rare in the fœtus or infant, in any part

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In regard to the occurrence of sarcoma in the kidney of the young, I have shown by the testimony of some of the best-known modern writers that between the two most malignant forms of pseudo-plasm, sarcoma and carcinoma, very little, if any, difference has been made. It has, therefore, struck me as advisable to study the older reports of renal tumors in regard to their history and nature. A number of them are undoubtedly not cancerous as they have been claimed to be, but sarcomatous³; not to speak of the undoubtedly genuine case of renal sarcoma observed by Marc Sée above alluded to.

of the body, is indeed true, but not so much so as it was formerly believed to be. The rarity of the cases makes every single one so much the more interesting, and instructive. Besides, the reports of congenital and infant sarcoma date of the last few years only, and are after all—as this paper will show—not so excessively rare as not to make it very probable indeed, that when less attention was paid and less diagnostic acumen exhibited than is common in our times, cases of sarcoma occurring in internal organs remained often undiscovered. Finally, as far as the absence of glandular swelling around, and depending upon the presence of, a sarcomatous tumor is concerned, the inference drawn from what is commonly, or frequently, observed in carcinoma, does not correspond with the facts. Even primary carcinoma may not result in secondary tumors for a protracted period; that sarcoma should have no such secondary effects, is quite a frequent experience.

³ The following case may be doubtful, and for that reason I do not claim it at all. But it resembles very much such cases as have been proven to be sarcomatous by autopsies. It is that of a boy of four years reported by Dr. M. Shepherd (*Amer. Journ. M. Sc.*, Jan., 1858, p. 291). He was the child of healthy parents, and under observation from Jan. 19th, 1857, to April 20th, when he died. He had first complained in October, the previous year, of dyspeptic symptoms and vomiting. After that time he had occasional pain, and fever, with vomiting, and emaciation. The tumor, which had been mistaken for one of the liver, was found to belong to the right kidney, uniformly attached both to the right and posterior wall of the abdomen, from the pubes to the diaphragm. Anteriorly it involved within its investing membrane almost the whole of the ascending colon. On the left side of the tumor, along the entire length, the ilium

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Thus Ebenezer Gairdner published in *Edinbg. Med. Surg. Jour.*, 1828, vol. 29, p. 312, a case of "fungus hæmatodes" in the kidneys. The girl from whom the specimen was taken, was at the time of her death three years old. When she was one year old, her health appeared to fail, and the belly rather full. One of the most prominent symptoms was a morbid appetite for food and craving for drink. Large quantities of porter, and the chalk from the walls, were eagerly swallowed. The urine was not bloody until the last day of her life. The tumor, 10 inches in length, 16 in circumference, and weighing 5 pounds 3 ounces, was found to be the left kidney contained in its proper covering; but with the peritoneum. adherent to it anteriorly. At the lower end a thin layer of the cortical substance remained intact, the ureter could be traced into one of the many cystic dilatations; at the upper end the substance of the tumor was more uniform, soft, brain-like, of firmer consistence towards the middle and lower end. The right kidney was similarly changed, but was smaller, weighing only 1 pound and 3 ounces. No other organ was affected.

Van der Byl had a case before the Pathological Society of London, a description of which I find in the Transactions of that Society., vol. VII., p. 268, and *Lancet* of Sept. 13, 1856. It is there called a cancerous growth of the kidney, weighing thirty-one pounds, and was removed from the body of a boy of eight and a half years. The child's abdomen became larger on the left side than on the right, soon after birth. It continued to increase in size very gradually until six months before his admission into the Middlesex Hospital; afterwards it grew very rapidly. The tumor was slightly movable, semi-elastic in some parts, not painful. The intestines were felt over the edge of it

was attached. Posteriorly, the aorta and vena cava were involved together with the right kidney. It weighed ten pounds and compressed the liver considerably. "It contained the right kidney almost entirely transformed into purely white lobules of soft medullary matter which surrounded it. There was no blood, and but few blood vessels in this deposit." A similar deposit did not exist in or about them.

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on the right side. The patient had no fever, no hæmaturia, no loss of appetite, but grew thin and died of exhaustion.

There were firm adhesions over the greater part of the tumor. The abdominal viscera were much displaced but otherwise healthy. The anterior aspect of the tumor was found to consist of the concave portion of the right kidney, which was enormously enlarged. The ureter was normal and yielded some clear urine when pressure was made over the distended pelvis. Beyond the limits of the healthy renal tissue the kidney substance seemed converted into a thick fibrous layer which quite surrounded the growth. It was closely covered by peritoneum, and contained a cavity with about eight pints of a dark, grumous, viscid fluid, with numerous, yellowish, shreddy, sloughing masses. The consistency of the tumor was different in different parts. Some were semi-transparent, gelatinous, pale yellowish, others were hard fibrous masses, which appeared again as bands traversing the gelatinous substance. "The microscopic examination confirmed our opinion as to the cancerous nature of the growth. The fluid taken from a protuberance at the upper part of the tumor exhibited large cells with several nucleoli and nucleoli, caudate and spindle-shaped cells, with granular corpuscles and molecular matter." Evidently the history of the case, which extends over eight years, is that of sarcoma, not of cancer. The alleged microscopical examination made nearly thirty years ago also speaks for sarcoma rather than for carcinoma.

Dr. C. C. F. Gay reports (*Buffalo Med. and Surg. Jour.*, Dec., 1868) the case of an "encephaloid tumor weighing 36½ pounds in a child eight and a half years of age—death—autopsy." The boy, when two and a half years old, after a fright voided urine and a few drops of blood; later blood passed in larger quantities, and a quart was passed in one night, but this no doubt is an exaggerated statement. The boy continued to discharge blood at intervals for two years and a half, but the greater portion of this time he would be quite well. About that time a swelling was observed in the left lumbar region, which in-

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creased very rapidly until the whole abdomen was very much distended. Up to a short time before his death the boy walked about, ate heartily, passed urine sometimes in large quantities and frequently, sometimes not for two days, and suffered from diarrhœa during the last fortnight of his life. The tumor was found to occupy the entire extent of the abdomen; the transverse and descending colon traversed the anterior surface of the tumor. It was firmly attached in all its parts, but most firmly to the left lumbar region; it weighed thirty-six and a half pounds. It was lobulated and contained pus depots in some of its parts; portions were hard and unyielding, while other portions were somewhat soft, varying in color, containing blood-vessels immense in size, and also cysts. Something was found attached to the tumor supposed to be the rudiment of the left kidney. The right kidney was larger than a normal adult kidney, and weighed six ounces. Intestines and bladder were normal.

I now report four cases observed by me. Their nature was proven by autopsies. I have scanty notes of a number of others, none of which, however, was observed through any length of time, or finished up by an autopsy. A few I remember, but find no history recorded. That their total number amounts to at least eight in addition to the four enumerated below, I am certain. But I abstain, for the above reason, from claiming them as belonging here.

I. Oscar J., was born July 27th, 1876; he was presented on the 15th of March, 1879, when he was two years and eight months old. His father reported that his own mother had carcinoma, that he had lost seven brothers and sisters, one with inflammation of the bowels, but none with cancer. This child had summer-complaint more or less, for several months, during his second year. In March, 1878, he was taken with convulsions and coma, and it was noticed that no urine was discharged for some time. On the following day, he passed a good deal of blood, some of which coagulated, and a large quantity of urine. Six weeks subsequently, he passed bloody urine again, but without any of the symptoms previously enumerated; at the same time he appeared to be quite well. In May, 1878, his abdomen

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began to swell; its left side was filled with some hard substance. When the boy first came under my observation, the hardness was not equal over the entire surface of the mass. The larger portion of the tumor was dense, but in some places there was a sensation of fluctuation. There was a good deal of tympanites to the right of the vertebral column and only a limited amount to the left. The spleen and liver were normal. The child urinated frequently, and sometimes involuntarily. His appetite was good. The epiphyses of a number of his long bones were rhachitical. He still perspired on his head, particularly in the occipital region. Emaciation was not marked. On the 6th of June, it was noticed that the tumor had considerably increased in size. In the meantime the patient had taken codliver oil and iodine, which did not interfere with digestion. Occasionally, he vomited, particularly in the morning. There was a trace of albumen in the urine.

On October 2d, 1879, I felt I ought to be quite sure as to whether or not the tumor contained fluid, and therefore made a number of punctures at points where a cyst-like feel was present, but no fluid other than a small quantity of blood was obtained. At that time the circumference of the body at the ensiform cartilage was sixty-four centimetres; the distance from the manubrium to the umbilicus sixty-four; the circumference at the umbilicus sixty, and the distance between the anterior superior spinæ nineteen centimetres. On November 1st, the tumor had increased in size to such an extent that it nearly filled the abdominal cavity, extending to within two and a half centimetres of the right superior anterior spina. On December 12th, the general appearance of the child was less good than formerly. The tumor had evidently increased very much in size, and the child suffered a great deal of abdominal pain, particularly when in the horizontal posture. Urine was eliminated in large quantities and contained some little albumen. The bowels were still quite regular. Now and then, however, retention of urine would set in, with considerable pain. Occasionally, it became necessary to use the catheter; sometimes, however, when a physician was called to use the instrument, the child would object to its being intro-

duced, and subsequently pass a large quantity of urine without blood or foreign material; now and then, however, with small discolored coagula, and then was relieved. Without much variation in the symptoms, the child lived until the 8th of March, after having suffered from much pain and sleepless nights for weeks, and exhibited marked emaciation. From the beginning, the diagnosis had been sarcoma of the left kidney. The tumor having existed for some time before I saw it, I concluded that, if it had been carcinomatous, the child's general condition would not have been so good as it was when I made my first examination. Otherwise, as a matter of course, the diagnosis rested between sarcoma and carcinoma. Particularly was that clear after I had punctured the tumor for purpose of ascertaining whether, or no, cysts existed in it.

Autopsy.—The tumor was about the size of a man's head. The right kidney was quite normal. The tumor consisted of a solid sarcomatous mass. There was no cyst whatever, but there was a peculiar condition, which consisted in the presence of apparently distinct masses separated from the general mass, looking somewhat like a polypus locked up in the narrow uterine cavity, and surrounded by a thick elastic membrane. Some of these masses were loose in their cavities; it was thought that the loosening was due in all cases to extravasation of blood into the connective and partially elastic tissue by which they were surrounded, as a number of such nests were certainly surrounded by undoubted hemorrhagic clots. They consisted of muscular tissue, striped. No normal renal tissue could be found in the tumor, the main bulk of which, as far as it was not muscular, was composed of connective tissue, and round and spindle-shaped cells. The colon was found adherent in front of the tumor, and compressed. It had been perforated by one of the punctures made for the purpose of diagnosis.

II. A boy of two and a half years was presented to me January 16th, 1881, with a considerable enlargement of his abdomen, dilated cutaneous veins, moderate tenderness on pressure without increased temperature. Appetite and defecation were fairly normal. Micturition normal as far

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as could be learned from the parents who were ignorant and indolent people living in the suburb of Westchester; at all events no hæmaturia had been observed. The enlargement was mostly in the left side, and had been observed over a year. The percussion sound in the left renal region was rather dull, but not absolutely so; but the spherical mass, with but little modulation of the surface, could be easily grasped between the vertebral column and the median line of the abdomen. It felt smooth, yielded no fluid on being punctured, but the sensation of semi-fluctuation in several parts. The child remained without treatment, and a hasty post-mortem examination was made on April 20th, 1881. The tumor then weighed about six pounds, was adherent to the stomach only, though there was some recent peritonitic fluid in the abdominal cavity, was—with the exception of a few small cysts near the anterior surface, of rather uniform consistency, the central portion rather a little softer and more brownish. The color otherwise was a whitish gray on most sections. No trace of the left kidney was found, the left ureter above the bladder about six centimetres long, the right ureter normal, the right kidney normal but rather large. The tissue of the tumor was pretty uniform, the softer parts exhibiting more round, the other more spindle-shaped cells, both portions containing but trifling amounts of connective tissue, except near the surface where the latter was more dense and copious.

III. In June, 1882, Dr. Govan, of Stony Point, N. Y., sent me part of a diseased left kidney removed from the body of a still-born female infant of normal size, delivered at full term with some difficulty on account of the considerable circumference of the abdomen. The family history revealed no presence of malignant tumors, and the pregnancy of the mother (primipara) was not attended with any mishaps. The baby died during birth, the membranes having ruptured several hours before parturition was completed. The specimen contained no cysts, no ureter, no normal renal tissue, was whitish and of uniform consistency, and consisted of large nests of round cells irregularly imbedded in and surrounded by connective tissue.

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No left kidney was found separate from the morbid mass. No metastatic deposits.

IV. S. L., two years old, was admitted to Bellevue Hospital, Aug. 8th, 1883. His father first noticed that the child was sick a week before admission. He lost appetite, vomited at times and grew feeble. At that time it was observed that the boy's abdomen grew larger; sometimes he would feel hot and appeared feverish. No diarrhœa. No bloody urine. Vomited severely on Aug. 7th and abdomen increased rapidly. On admission, temperature 38.5° C., pulse rapid, patient anæmic. Abdomen distended, a large solid mass nearly continuous with the liver extended from nearly the free border of the ribs on the right side to crest of ilium, from linea alba to vertebral column. No fluid in the abdominal cavity. Abdomen but little tender over tumor.

Aug. 9th. Temperature 38° . Appetite fair. No vomiting. One loose movement. Pulse feeble. Whiskey. Sol. Fowler, 1 drop, 3 times daily.

Aug. 10th. Exploring puncture drew off a little bloody serum. Urine contains neither albumen nor casts.

Sept. 21st. Patient has improved in general health, has some appetite and is less anæmic. Abdomen a little more swollen. Treatment: syr. iodid. ferri 10-12 drops, three times daily.

Oct. 1st. Patient was seen by me on my return to the city. Dullness amounts almost to flatness over the tumor. Between it and the liver there is still a zone of tympanitic percussion sound of one-half of an inch to an inch. Loss of voice and respiratory murmur on the right side, several inches above diaphragm. Few subcrepitant râles. Abdomen markedly distended. Face flushed. Temperature $38\frac{1}{2}^{\circ}$ (rectum). Some dyspnœa. Whiskey and digitalis.

Oct. 4th. Temperature 38° - $38\frac{1}{2}^{\circ}$. Less dyspnœa. Abdomen more distended. Patient complains for the first time, of pain when the tumor is being manipulated. Dullness on right side diminishing; voice and breathing are heard very distinctly. Eats and sleeps well. Treatment continued, with sol. Fowler, in addition.

Oct. 7th. Temperature 38 - $38\frac{1}{2}^{\circ}$, the latter in the even-

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ing. Friction is perceived when the hand is held firmly on the tumor. Some diarrhœa. Fowler stopped. Camphor and opium.

Oct. 12th. Tumor still increasing. Abdominal wall rather tense. Patient at times in great pain; considerable tenderness over the tumor. Abdominal veins very much distended. Temperature normal. Tinct. op., paregor. and whiskey. Syr. ferr. iodid.

Oct. 15th. No rise of temperature all week. Groans sometimes with pain in the abdomen. Appetite very good. Sleeps well. Tumor still increases in size, abdomen very tense. Some dyspnœa. Dullness on percussion over lower part of right lung and absence of respiratory murmur. The aspirator brought away about 150,0 grammes of a bloody syrupy fluid. Dullness disappeared, but some bronchophony still persisted. Dyspnœa markedly relieved, abdominal veins less distended. Opium, camphor, whiskey, potassium iodide.

Nov. 8th. Child grows weaker, abdomen increases in size. Restlessness. Pain on pressure.

Nov. 15th. Weakness and emaciation increase. Abdomen both more tense and tender. Opium required very frequently. Temperature 38-39°, pulse rapid and feeble. Semi-coma. Œdema of lungs. Death.

A peculiar symptom was present during the whole time during which the patient had been under observation. There was always slight semi-fluctuation over the region of the tumor, as usual with large sarcomata, but one day during the last week of the child's life, decided fluctuation was found and remained to the end. Some decomposed bloody fluid was withdrawn with the exploring needle.

In the abdominal cavity there was a small amount of clear serum. Between the intestines and the abdominal wall, and also between the various parts of the intestine, there were numerous old and recent peritonitic adhesions. The tumor was examined by Dr. Trudden, pathologist to the first division of Bellevue Hospital and the College of Physicians and Surgeons, who kindly furnished the following report of autopsy:

Body much emaciated. On the right side was a tumor,

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in general firm, but in places soft, filling the right side of the abdomen, and bulging out its walls laterally and anteriorly. On opening the abdominal cavity a large encapsulated tumor presented itself, nearly filling the abdominal cavity and firmly attached over the region of the right kidney, and slightly adherent to the right abdominal wall. The ascending colon ran obliquely over its lower left segment, and the remainder of the gut was crowded closely into the left side of the abdominal cavity.

On the anterior surface of the tumor the wall was thin and flaccid, and an incision opened into a cavity containing about half a pint of brownish-red fluid of ropy consistence. Microscopical examination of this fluid showed numerous larger and smaller spheroidal cells greatly degenerated, and much granular detritus. The tumor was firmly adherent above the liver. The diaphragm on both sides was crowded up to the bottom of the third intercostal space. Spleen and left kidney normal. Left ureter slightly dilated. On being removed, the tumor measured 25 cm. in length, 15 cm. in breadth, and 12 cm. in thickness.

On the inner posterior surface the slightly dilated ureter entered the tumor at a point of slight depression. It terminated in a mass of connective tissue which was hollow, the cavity having the form of distorted calices. Around that depression in the surface of the kidney was a crescentic mass of tissue about five mm. thick, which, on microscopical examination, proved to be compressed kidney tissue.

The bulk of the tumor was coarsely nodular, whitish, very soft, in most parts almost diffuent. There were numerous small blood extravasations in various parts. Near the centre of the tumor was a large blood-clot, about five cm. in diameter.

In addition to the anterior thin-walled cyst was a smaller one near the posterior surface filled with the same brownish-red, ropy fluid. The two cysts had the appearance of having been formed by simple softening of the tumor tissue.

The stomach contained a considerable quantity of tenacious mucus.

The opening of the thorax was not permitted by the friends, but the organs were removed from below. The

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heart was normal; the lungs were somewhat adherent, but otherwise normal.

The microscopical examination of the tumor showed it to be a round-celled sarcoma.

The specimen was exhibited before the Obstetrical Society of New York in its meeting of December 4th, 1883 (Cf. *The Amer. Journal of Obstetrics and Diseases of Women and Children*, Sept., 1884, p. 1006).

A brief summary of the cases stored up in literature will be found interesting:

Hahn demonstrated, before the Obstetrical Society of Berlin, on Feb. 27th, 1872 (Berl. klin. Woch. IX., p. 269) a sarcoma of the right kidney removed from the body of a child, who died at the age of ten months. It had the size of an infant's head, and had been noticed but four weeks before death. There was no difficulty in micturition. At the autopsy the tumor was enucleated with great facility.

Paturard and Garsaux (*Le Progrès méd.* 41, 1875) report the case of a girl of six years, who suffered from a sarcoma of the right kidney. Nothing was known of its first development. When the child, emaciated and without appetite, entered the hospital of St. Eugénie, the tumor in the right lumbar region was of the size of a child's head, movable, hard, not painful, and exhibited a smooth surface. There was hæmaturia, occasionally. In the hospital the patient remained three months until she died. The tumor meanwhile grew considerably. Hæmoptoe appeared in the last few days, there was dullness over the right lung, and crepitant râle over both, and excessive dyspnœa. The autopsy revealed a tumor originating from the right kidney, 1300 grammes in weight, and mainly consisting of small, round cells. In the liver there are two tumors of the size of a chestnut on the surface, and several small ones in the parenchyma. The lungs contain so many that the healthy tissue has in part been obliterated.

Vogelsang (*Memorab.* 2, 1876) has the case of a sarcoma of the left kidney in a girl of three years. A fall was considered as a possible (proximate) cause of the

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disease. The tumor commenced in the left lumbar region, extended through the whole abdominal cavity, and terminated fatally after an unsuccessful puncture had been made. It was of great elasticity, and rather firm consistency, and contained cysts with pultaceous contents.

A. Baginsky demonstrated a sarcoma of the left kidney, which had been removed from the dead body of a child (female?) of seven months, before the Medical Society of Berlin, Feb. 9th, 1876 (*Berl. klin. Woch.*, 1876, p. 249). Hæmaturia had existed for several weeks, in intermissions. The tumor was situated in the left side of the abdomen and extended from the margin of the ribs to the median line and the os ilium. It then continued to grow beyond the median line, developed fluctuation in the left side, and gave rise to great dyspnœa. A puncture withdrew 470 C. Cm. of a dark-brown fluid which contained blood, urea and uric acid. Now and then, a convolution of intestine could be distinctly noticed across the right half of the tumor. The autopsy yielded the following results: The left kidney was transformed into a cystoid tumor and consisted of two parts, one of which was a cyst containing three cups of fluid; the other was solid and of the size of a child's head. It adhered to both abdominal wall and diaphragm. Colon and rectum covered the tumor from umbilicus to pelvis. There was no change in either mesentery or mesenteric glands. The tumor was a spindle-cell sarcoma. It contained particles of renal substance with normal canaliculi and epithelia. The right kidney was in a condition of parenchymatous nephritis. Baginsky emphasizes hæmaturia and the bulging of the intestine in front of the tumor as characteristic. (Cf. also *Deutsche med. Woch.*, 1876, Nr. 10.)

Wm. H. Geddings has the case of sarcoma of the left kidney in a negro girl who died at the age of three years and nine months (*Gynecological Trans.*, vol. II., 1878). Abdominal enlargement was not observed by the mother until nine months before death. No hæmaturia, immense appetite, regular defecation, rapid growth, emaciation extreme; still walking two days before death. The tumor weighed thirteen and a half pounds, was mostly smooth, with two large outgrowths, and several cysts on its sur-

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face. Across its anterior lower portion, and firmly attached to it, was the transverse colon; over it a tympanitic percussion sound was reported to have been observed during life. It was adherent to the stomach, and posteriorly. The right kidney was enlarged but healthy. The left ureter was surrounded by vessels distended with blood. Soon after issuing from the bladder it was lost in the substance of the tumor, in which no trace of the kidney could be found. "On dividing the tumor in its longest (eleven inches) diameter, the cut surface presented a rough, uneven surface of a grayish yellow color, semi-transparent, but more opaque and yellow in the older portions, which in some parts had undergone softening. From the whole cut surface exuded a milky juice. The liver was of normal size, but presented on its under surface, immediately beneath the capsule, and extending into the substance of the organ, yellow masses about the size of marbles which, when cut, also exuded a milky juice." The microscopical examination of Dr. J. C. Warren, of Boston, proved the sarcomatous nature of the tumor.

Landsberger (Berl. klin. Woch., 1877, Nr. 34) has the case of a girl of seven months, who was feeble and anæmic from birth. She suffered from cough for some time, and from insomnia, which was not relieved by narcotics. There was no hæmaturia. Only six days before her death a tumor was felt in the right mesogastrium; it grew rapidly, was not painful and did not follow the respiratory movements, though neither palpation nor percussion allowed it to be differentiated from the liver. No fever, no vomiting, no constipation, no hæmaturia, no perceptible diminution of urine. In the autopsy the diaphragm was found pushed upwards, the intestines compressed. Both kidneys were found morbid. They were each a tumor, from twelve to fourteen centim. long, firm, of the shape of the kidney, grayish-brown or whitish, cystic in different places. In some places they were covered with remnants of the renal capsule, and still exhibited parts of the normal tissue. The right was larger than the left, the weight of the abnormal masses was 587 grammes. There were no changes in liver, spleen and stomach. Cohnheim made the micro-

scopical examination, and designated the specimen as congenital transverse-striped myosarcoma of the kidneys. A third tumor originated from the lower end of the right kidney and extended across the vertebral column in the direction of the left kidney. It was soft but solid, of the size of a fist, grayish-white. It was but loosely adherent to the kidney, by means of connective tissue. To the retro-peritoneal connective tissue it was also closely attached.

R. Elben (Würtemb. Med. Corr. Bl., Nr. 14, 1880) described the case of a boy who died at the age of five years. Four or five months previous to his death he suffered from a fall and consecutive hæmaturia. Another trauma resulted in pain in the left side of his abdomen, tumefaction, fever, and cachectic appearance. Palpation and percussion revealed the presence of a spherical tumor, which was punctured without yielding a fluid. Peritonitis set in and destroyed the child. The tumor weighed four kilogrammes (eight pounds) and had a circumference of 67 centimetres. It had the consistency of brain substance, and contained soft nodules and cavities filled with bloody contents. It surrounded the left kidney and entered slightly into the tissue of the left kidney, which was rather atrophied. In the pleura was a metastatic deposit. According to Schnepffel, who ascribed its origin to traumatism and hæmorrhage, it was a myxosarcoma and started in the surrounding cellular tissue.

John Abercrombie presented to the Pathological Society of London (*Transact.*, Vol. XXXI., 1881, p. 168) "three cases of sarcomatous growths invading both kidneys from without." They were those of a male of three years and three months, a female of two years, and one of four years. In all of them both kidneys were affected, with enlarged but otherwise normal spleen and normal blood, and also without much enlargement of lymphatic glands with the exception of an increase in size of the gland opposite the hilus of the kidney in each case. "Microscopical examination of the extrapelvic growth in case 3 shows that it is mainly composed of a loose connective tissue, with masses of small, round cells interspersed in its meshes; these are most abundant around the blood-vessels. In

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places where the round cells are less numerous there is a good deal of extravasated blood. In cases 1 and 2 the growth is of a similar structure, but more largely composed of round cells. The secondary deposits in these two cases consist of masses of round cells. In these two cases, too, there is a certain amount of parenchymatous nephritis, as shown by the presence of blood-corpuscles in the tubules, and proliferation of the epithelial lining. The spleen in each case shows a single hypertrophy of its normal constituent elements."

In case 1 the weight of the right kidney was $3\frac{3}{4}$ ounces, of the left 4. The supra-renal capsules were normal. The pelvis in each kidney was larger than normal, and presented everywhere a purple tint. This was due to the presence of the new growth which was pushing its way into the kidney at the hilus, but had not actually invaded its structure anywhere.

In case 2 the kidneys were much enlarged, weighing $6\frac{1}{2}$ ounces each; capsules stripped off easily, surface smooth, very pale, but mottled irregularly with pink patches. On section the kidneys were pale, cortex very deep; several patches were seen formed of groups of red radiating lines starting from the pelvis and going to the surface, where they betrayed their presence in the patches mentioned above.

In case 3 both kidneys large, surfaces smooth; on section cortex not increased in depth, not pale, not confused; the whole pelvis presented a deep purple appearance, owing to the presence of a soft purplish mass at the hilus of the kidney; the lining membrane of the pelvis quite smooth. The mass in the hilus when viewed from the outside was flattened, about three-quarters of an inch thick, and rounded towards the spine.

Kocher (D. Zeitsch. f. klin. Chir. IX., p. 312) reports the case of a boy of two and a half years, who had an enlarged abdomen since birth. No abnormal condition of urine. Colon descendens cannot be diagnosticated in front of the tumor, but is found to cover the anterior surface of the tumor in a vertical direction, during the operation. The tumor has the shape of the kidney, is 15 cm. long, 16 wide

and 10 thick, and enclosed in a firm capsule. Ureter and pelvis are preserved in their normal condition. The tumor appears to originate in the central portions of the left kidney. Removal was determined upon. As the lumbar regions could not be utilized because of the size of the tumor, the incision had to be made in the linea alba, above the umbilicus. The parietal peritoneum, raised by the tumor from behind, was then incised, arteries secured, and the tumor enucleated. The pedicle was then ligated with solid catgut, and the tumor cut away.

The child died in two days of septicæmia, the result of infectious peritonitis. Kocher was first inclined to believe that death had occurred from the omission of a carbolic acid spray, for which one of salicylic acid was substituted. But there was no phlegmonous inflammation in the retroperitoneal cellular tissue; the intestines, however, were adherent to each other by fibrine. He attributed this peritonitis to insufficient antiseptics in this, that the intestines which protruded from the abdominal cavity during the operation, were wrapped up in a flannel but unsatisfactory disinfected. If this had not been so, the operator believes that the case might have recovered, in as much as the operation itself gave rise to no particular difficulties.

Schneller's case (*D. Zeitsch. f. Chir.*, vol. IX) was observed in a girl of four years. Percussion exhibited no line between the spleen and the tumor which measured 22 cm. in length, 14 in breadth, and 11 in thickness. A puncture yielded a brownish liquid containing spindle and round cells. It began to be noticed a year previous to death. It consisted of larger and smaller masses which were separated from each other by septa of connective tissue. It was attached mostly to the atrophied and flattened left kidney, and originated in the cellular tissue of the hilus between the kidney and its capsule; from there it entered into the tissue of the kidney, the posterior and anterior half of which were separated from each other by the invading mass. The kidney itself was not affected by the new growth which consisted mainly of spindle-shaped and round cells. The right kidney was enlarged, but not changed in its texture.

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C. E. Stedman reports (*Bost. Med. and Surg. Jour.*, No. 10, 1881) a sarcomatous tumor of seven pounds involving the left and also the right kidney in a girl of four years. No renal morbid elements and no blood were found in the urine. Ascites set in eight or ten days before death; there was also œdema of the legs.

Huber and Boström's case (*D. Arch. f. klin. Med.*, vol. 23, p. 205) was that of a boy of three and a half years. The tumor involved the tissue of the left kidney and weighed eleven pounds ($5\frac{1}{2}$ kilog.). It contained cysts formed by the dilated urinary tubules, not supplied with a membrana propria.

Berner (*Norsk Mag.*, 1881, p. 51. Quoted in Gurlt and Virch. Jahresber, 1882, II., p. 207) observed a boy, who died in February, 1881, after having suffered from a contusion in August, 1880. He then complained of much pain extending into the hypochondriac and lumbar regions, and on moving his vertebral column. The next symptoms were a scoliosis with its concavity to the right, constipation, dysuria, and albuminuria. During the month of September a swelling was noticed in the right lumbar region, which grew rapidly, exhibited a smooth surface, was fluctuating and immovable. Dullness on percussion was noticed at once. Anasarca, emaciation, and dyspnœa followed soon. The tumor weighed 5800 grammes, had a length of 27, a breadth of 20 centimetres, originated from the right kidney, filled the whole abdominal cavity, was covered with peritoneum to the left of the median line, was closely adjacent to the abdominal wall on the right, and consisted mainly of round cells.

A sarcoma of the right kidney of a female, aged four years, was described by Wm. H. Day (*Trans. Pathol. Soc. London*, 1881, vol. XXXII., p. 142). Its presence resulted in displacement of the heart to the left and upwards, compression of the lungs, and a considerable dilatation of the superficial veins and enlargement of the abdomen to such an extent, that its umbilical circumference measured 27 inches, the distance of the vertebral column to the linea alba on either side amounting to $13\frac{1}{2}$ inches. The left spina anterior had a distance from the umbilicus of $6\frac{1}{2}$, the

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right 6 inches. Amongst the few symptoms enumerated were emaciation and œdema of the labia and lower extremities. The tumor weighed $9\frac{1}{4}$ pounds, was of ovoid shape, covered with peritoneum, pale, slightly lobulated. The renal artery and vein entering it were much dilated. The ureter was normal, and entered a solid body which was normal kidney. The tumor seemed to grow from the anterior surface of the kidney, and was situated between this and its capsule. The zone closely adjoining the capsule appeared to be simply the lymphoid tissue naturally lying beneath the capsule; from this tissue the growth may have started. It consisted of spindle-shaped cells largely interspersed with round cells, which in some places were quite abundant.

Dawson Williams has a case of myosarcoma of the right kidney of a male infant, probably of congenital origin, who died at the age of thirteen months. No suspicious family history. The tumor weighed one pound thirteen and a half ounces, one-sixth part of the total weight of the body. Into it the ureter was traced, a director passed in, but no trace of normal kidney was found. It was smooth, indistinctly lobulated, yellowish white, soft, in its upper part almost diffuent. On its anterior surface was a sort of groove in which lay the caput coli and part of the ascending colon. It consisted of fibrillated bundles composed of parallel cylindrical fibres, which crossed each other in all directions; also of spindle-shaped cells, and sections of kidney tubules. The fibrillated bundles were transverse muscular fibres. A gradual transition appeared to exist between these and ordinary nucleated spindle-shaped cells. In several instances cells having a distinct nucleus and an elongated spindle-shaped form were seen distinctly striated. In some instances the striated fibres were seen to bifurcate. The new growth appeared to be truly interstitial, since it lay between, and displaced the normal elements of the kidney.

Frederic S. Eve (*Trans. of the Path. Society of London*, vol. XXXIII., 1882, p. 312) presented "specimens of tumors composed of striped muscle and sarcoma tissue (striped myosarcoma) connected with the kidneys." One

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was taken from a male child who was sixteen months old at the time of his death. He had first been attended, two months previously, for a swelling in the right flank, apparently about a finger's breadth below the edge of the liver. The child's health was then good. The swelling was of the size of a hen's egg, quite soft and superficial, so that it gave rise to mistakes in diagnosis and explorative punctures on the part of a number of medical men. The tumor then grew rapidly, the strength of the child failed, dyspnœa set in, and he died of exhaustion.

The right kidney, with which the tumor was connected, was found normal in structure, but its upper half is flattened out, and upon its anterior surface was a rounded concavity or depression, over which the parenchyma was exposed, but not visibly altered. The pelvis, ureter, and vessels of the kidney were normal. So was the left kidney. The tumor was oval, $7\frac{1}{2}$ inches in length by $4\frac{1}{2}$ in width, and $4\frac{1}{2}$ in thickness. The surface was nodulated and capsulated. The consistence of the tumor was uniform and firm, very much resembling in appearance the myo-fibroma of the uterus. It was composed for the most part of striped muscular fibres arranged in fasciculi, generally parallel to each other, but also in places scattering and interlacing. Some of these were enclosed in fine fibrillar connective tissue, containing round, oval, and a few spindle-shaped nuclei. Scattered among the muscular tissue were nodules composed either of closely aggregated round cells, or the same intermixed with a few spindle-cells, having oat-shaped nuclei, while in other places fasciculi composed of spindle-cells traversed the round-cell tissue.

In the collection of tumors of the kidney of the Museum of the Royal College of Surgeons, Mr. Eve then found one (1908) inscribed "the kidneys of a child with medullary tumours." The specimen was put up at least 90 years ago by John Hunter. "One kidney is of the natural size, and appears healthy externally and on section; but a rounded tumor an inch in diameter, is attached to the hilus, so that the pelvis is completely obliterated by it. The ureter passes out between the kidney and the posterior surface of the tumor, a section of which presents the ap-

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pearance of interlacing bands of fibrous tissue, and is of a yellowish or faint brownish-white color. The new growth is sharply defined from the kidney substance by a layer of connective tissue, but the capsule of the kidney is continued over it.

The tumor connected with the right kidney is 7 inches in length by 5 inches in width. The sharp limitation of the tumor from the kidney substance is very marked in both specimens. They are distinctly separated by a layer of connective tissue.

In histological structure the larger tumor precisely resembles the first described, but the round-cell sarcoma tissue scattered through it appears more abundant. The cysts were without epithelium; in their vicinity elongated tortuous sharply defined spaces were observed filled with deeply stained round cells, by the degeneration of which the cysts may have been formed. The smaller tumor connected with the left kidney is composed largely of round cells, either closely aggregated or separated by a small amount of homogenous connective tissue with occasional fasciculi of spindle-cells; but widely distributed through it is striped muscle tissue, with apparently more numerous muscle corpuscles, and cells resembling these are thickly scattered in the connective tissue between and about the fibres.

Hicguet (Acad. Roy. de Méd. de Belg. Séance du 28 janv., 1882, Centralbl. f. Chir., 1882, Nr. 14) removed a sarcoma of the left kidney by laparotomy. Patient was six years old. In February, 1880, he was taken with pain in the left renal region. A swelling of the size of an egg was then found; it increased very rapidly until in August, 1881, it filled more than half the abdominal cavity. The tumor was removed on September 10th, 1881, through an incision extending from the ensiform process downwards to below the umbilicus. Left ureter, and renal artery and vein were tied with double ligatures, and a drainage tube carried from the anterior wound through a counter-opening in the lumbar region. Recovery was complete in 36 days, and no relapse at the time of the report.

- The *Brit. Med. Jour.* of Feb. 4th, 1882, contains the re-

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port, by H. A. Fotherby, of a case of round-celled sarcoma of the right kidney, which had been under the care of Dr. Donkin. It occurred in a female, two and a half years old at the time of death. Only three months previously the tumor had been observed to exist. It was then movable, its surface smooth and elastic, the superficial veins of the abdomen were very much engorged. In the last few weeks preceding death emaciation, vomiting, fever, hurried respiration, and finally convulsions were the most prominent symptoms. Hæmaturia is not mentioned, but a day before death considerable amount of albumen was found in the urine. Several months before it "was said to have been rather milky in appearance."

At the necropsy the tumor was found to be without adhesions, and not covered anywhere by intestine. It grew from the lower end of the right kidney, and was closely adherent to the inferior vena cava which was distended with clot and measured an inch and a half in diameter. After the peritoneal lining had been removed, the renal capsule was found spread out over the tumor, and adherent to it, but not to the kidney tissue proper. It was as large as a fetal head, but elongated and pyriform. Its length, including the kidneys, was $6\frac{3}{4}$ inches, of which only $1\frac{1}{4}$ inches consisted of kidney proper. Its broadest part measured 4 inches, and its thickness was from 2 to 4 inches. The ureters were healthy and pervious throughout. The general consistence of the growth varied in different parts. The central medullary portions were soft and pulpy, the peripheral hard and fibrous. Hemorrhages into its substance had occurred, marking out the direction of its fibrous trabeculæ. There was one large hemorrhage into the lower part of the tumor, "probably due to the (two) exploration punctures." The left kidney was unaffected; it measured $3\frac{1}{2}$ inches in length. The liver was large, the spleen hard, both hyperæmic. No other tumors, no metastases were found. The tumor was found to be a round-celled sarcoma.

J. Neumann observed a case in a girl who died at the age of $5\frac{3}{4}$ years; the tumor was first noticed 15 months previous to her death after a serious attack of peritonitis.

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It grew considerably without any important change in the function of the kidneys, and without any secondary glandular affections. The tumor was located in the left side and covered with a strong capsule, weighed from twelve to fourteen pounds, consisted in part of numerous cysts, in part of solid masses of various consistency, composed of spindle-shaped and round cells and interstitial fibres of more or less density. Muscular tissue was not found, nor was renal tissue discovered, though the suspicion was roused that an appendage-like proliferation from the tumor might be the kidney. The ureter could be traced a distance of two or three centimetres from the bladder. There were no metastatic deposits. The right kidney was enlarged, being 10 cm. long and from 3 to 4 thick.

In the paper accompanying the report of his case (*D. Arch. f. klin. Med.* XXX., 1882, p. 377) Neumann has collected as many as twelve similar cases from the literature of the subject. Of these, those of Landsberger, Geddings, Baginsky, Schneller, and Kocher have already been mentioned.

Eberth's case is that of a girl who exhibited her sarcoma of the right kidney at the age of 14 months, and died at the age of 17 (*Virch. Arch.*, vol. 55, 1872). It was a myosarcoma. There was also sarcomatous degeneration of the left kidney. Eberth was the first to diagnose the myomatous nature of some of these tumors, as far as their presence in the kidneys is concerned. In other organs transversely striated muscular tissue had been found before, mainly in tumors of the testicles. In regard to the latter Eberth refers to the fact that the loose intermediate tissue of the Wolfian bodies contains a large number of cells developing into connective and muscular tissue.

Ferréol (*Union Médicale*, vol. XIX., 1875). Negro child died at ten months. Tumor first noticed at four. Left kidney. Some normal renal tissue preserved. Intestine across the tumor, and adherent to it.

Cohnheim (*Virch. Arch.*, vol. 65, 1875). Girl. Left kidney. First noticed when one year old. Died three months later. Renal tissue partly preserved. Mostly

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myosarcoma; besides round cells. Metastatic deposit in the right kidney.

Sturm reports on two specimens of the pathological museum of Leipzig (Arch. d. Heilk., 1876). Girl of five years. Left kidney. Metastases about the porta hepatis. Girl of eight years. Right kidney.

Martineau (Un. Méd., vol. XIX., 1875). Left kidney. Girl of two years at death. Tumor first noticed three months previously. Intestine in front of tumor. Cysts. Cornil found connective tissue, spindle-shaped cells and renal canaliculi.

Marchand (Virch. Arch., 1873). Right kidney. Boy of seventeen months at death. Tumor first noticed at seven months. There were strong adhesions with liver, omentum and duodenum. The colon ascendens was attached to the margin of the mass. Metastasis in the liver.

Monti (Gerhardt: Handb. d. Kinderk., vol. V.). Right kidney. Girl of four months at death. Kidney partly preserved. Ureter and pelvis in existence.

F. Brosin (Virchow's Arch., 1884, vol. 96, p. 453) has the case of a congenital sarcoma of the left kidney. The patient was three years old at the time of his death, and had shown marked emaciation and swelling for two years past. The tumor contained 250,0 grammes of a clear liquid, weighed 580,0 grammes, was 14 centimetres in length, was divided into segments by strong bands of cellular tissue, a dense mass of which was also interposed between the pseudoplasm and the kidney. The latter was firmly attached with its lateral surface to the tumor, below and posteriorly. The cutaneous veins were greatly dilated; the right kidney was normal. There were no metastases. The tumor consisted of elastic and connective tissue congregated in nets or long tracts, of striated muscular fibres attached to the cellular tissue or accumulated in larger masses; and finally round cells in irregular deposits, and cuboid and cylindrical cells in separate groups.

Paul's case (reported in *Med. Press and Circular*, from Proceedings of Liverpool Med. Inst., April. *Brit. Med. Jour.*, April 19th, 1884) is that of a girl who exhibited

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an enlargement of the left lumbar region when six months old. It soon filled almost the entire abdominal cavity. Emaciation increased rapidly. The case had been under observation a year, when the child died. The tumor weighed six pounds (the rest of the body ten), had the appearance and consistency of brain substance and consisted of embryonal and vascular, cellular tissue more or less developed, similar to the subcutaneous tissue of the embryo. Its lower portion was solid, yielded, however, during life, the sensation of semi-fluctuation; its upper part was cystic. The pint of brownish fluid removed from it appeared to have been partly formed by the softening of a clot.

P. Wagner (*Arch. f. klin. Chir.*, vol. XXX., 1884, p. 517) has the case of a round-cell sarcoma of the right kidney in a girl of four and a half years, with metastatic deposits in the left kidney, liver, and lungs. In spite of the considerable diminution of renal secretion, sometimes amounting to anuria, an operation was attempted, but had to be given up because of extensive adhesions. Still the child survived the operation, but died some time afterwards of the disease.

J. L. Little's case is one of the latest and most interesting. According to the report of the proceedings of the New York Surgical Society of March 11th, 1884 (*New York Med. Jour.*, March 29th, 1884), he presented a specimen which he had removed at St. Luke's Hospital by operation, on September 11, 1883, from a girl four years old. According to the mother's statement, the child's abdomen had been swollen and hard from birth. One month previous to her admission this enlargement began to increase rapidly. On examination, the abdomen was found to be greatly distended, very tense, and fluctuating, and the subcutaneous veins over the surface were enlarged. The enlargement of the abdomen was so great that it prevented the child from walking or standing. There was marked dullness on percussion over the right side of the abdomen, extending several inches beyond the median line. From this point it was tympanitic. A distinct tumor could be felt occupying the entire region of dullness, extending upward to the margin of the ribs. There was no œdema

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of the feet. The urine was normal, and the child's general health was good.

On September 15th the tumor was aspirated, and about eight ounces of a dark-red fluid were removed. On examination, it was found to contain blood globules, but no further evidence as to the character of the disease was revealed. A consultation was held, which resulted in a diagnosis of a cyst, probably connected with the kidney (hydro-nephrosis), and an exploratory incision was advised.

On September 25th Dr. Little performed the following operation under strict antiseptic precautions: He opened the abdominal cavity by an incision two or three inches long, between the umbilicus and pubes, which was subsequently enlarged. A considerable quantity of fluid at once made its escape from the abdominal cavity. The tumor was found situated beneath the posterior layer of the peritonæum, extending from the pelvis up to the border of the ninth or tenth rib, and overlapping the spinal column. A large trocar was passed into the most prominent part, and nearly two quarts of a dark-colored fluid were removed. It was found that the upper portion of the tumor was solid. The peritonæum covering the tumor was then opened and the growth was carefully enucleated. Its upper part was found to be in such intimate connection with the kidney that it was necessary to remove that organ. A ligature was passed around the renal vessels, and the whole mass was removed. The hemorrhage during the operation was not great, and was readily controlled. The peritonæum was closed by catgut, and the abdominal wound by silver-wire sutures, and Lister's dressings were applied. The condition of the patient during the latter part of the operation was very feeble, and, although every means to bring on reaction were used, she died from shock about half an hour after the completion of the operation.

Microscopical Examination of the Tumor, made by Dr. Frank Ferguson: Small, round-celled sarcoma, with cysts. The tumor arises from the anterior aspect of the lower end of the right kidney. Its shape is spheroidal, and it measures six inches in diameter. It is surrounded by a fibrous capsule rich in small, round, and spindle-form elements,

and continuous with the capsule of the kidney. There are numerous cysts of various sizes throughout the tumor, into some of which hemorrhage has occurred; but, as a rule, their contents are a clear, serum-like fluid rich in albumin, and a few of the small, round cells of which the tumor is composed. In these cysts are also found kidney tubules and glomerules. Kidney structure is also seen throughout the tumor. The cells which compose the tumor are supported by a delicate frame-work of fibrillated material, and the entire tumor is rich in its vascular supply. The kidney is slightly larger than in subjects of this age, and, on microscopic examination, normal in structure beyond the line of invasion of the morbid growth.⁴

Epicritical Remarks.—The form of renal sarcoma may differ, it may retain the outlines of the kidney to a certain extent, may be a solitary spherical or speroid body, or consist of a conglomeration of nodi; in Baginsky's case it was composed of two parts.

⁴ Before these pages were ready to be printed, the following case was presented:

J. S., a healthy looking and lively boy, of Willett Street, is now fourteen months old. He was always in good health, suffered from diarrhœa, but very rarely, though he be fed, besides breastmilk, on "soup, potatoes, meat, coffee, beer," etc. On the 14th of January when he was first presented in my college clinic, and on the 15th and 17th I examined him. There is a tumor in his left lumbar region extending from near the vertebral column to the median line of the abdomen. It is hard, particularly posteriorly, semifluctuating anteriorly, somewhat elastic but solid, spherical, in its median portion (a little more to the right) slightly grooved in a vertical direction. I suspect that colon descendens is imbedded in this groove. It is painless. An exploring puncture yields no fluid. The percussion sound is dull over the whole region, less so in the immediate neighborhood of the spine than in the axillary line. But when the child is quiet the round mass of the size of a newborn head, can be fully handled and proves slightly movable. It can easily be distinguished from the spleen. There is no other swelling or tumor in any other organs. All the functions are normal.

The proposal of removal was answered by the non-reappearance of the child. That the diagnosis of renal sarcoma (primary) is correct, I have no doubt whatsoever.

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It may be solid, or contain cysts; these may be small and large, sometimes in large numbers. One contained 3000,0 grammes of liquid. The latter is serous, sanguinolent, brownish, viscid, colloid. When of uniform consistency the tumor may be hard, or soft. The number and size of the blood-vessels leading and belonging to it, varies. The section through its tissue exhibits on the surface a color between brown and red to a pale gray.

Its size and weight differ. Thirty-six pounds (18 kilog.) is the largest size reported. When of average size it is moderately movable, and not influenced in its position by the respiratory excursions of the diaphragm. Over it the abdomen is very much extended; the abdominal wall exhibits a large number of dilated veins which extend, sometimes, over the thorax on the side corresponding with the location of the tumor.

By its bulk it changes the relative position of the abdominal viscera, the liver or spleen are dislodged upwards and posteriorly, the intestines are compressed and dislodged backwards, the large intestine, or the ileum, is often found lying across the tumor, more or less vertically. Thus it was found by Baginsky, Williams, Geddings, Kocher, Marchand, Gay, and Jacobi (twice).

Sarcoma of kidney is found at a very early age, some were discovered at birth (van der Byl, Kocher, Brosin, Little, Jacobi), some within a few weeks after. The sex of the patients appears to be of little importance. Of all the cases in which the sex is reported, twenty were males, and thirteen females. Nor does it appear that either the right or the left kidney are affected in very unequal numbers. In nineteen cases the sarcoma was on the left side, in thirteen on the right; eight are reported to have been bilateral, either in the beginning, or at the termination of the cases.

The growth is generally slow, rapid only when hemorrhages take place either into the tissue of the tumor or into a cyst, which grows very unexpectedly under such circumstances. One required at least six, probably eight years until its final fatal termination.

It does not appear to be influenced by heredity. The

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children are mostly in good or fair condition, and remain so for a long time. At last, by the weight and size of the tumor giving rise to constipation, indigestion, and disorders of respiration and circulation, and thereby of general nutrition, it gives rise to marasmus. Early cachexia, as in carcinoma, does not occur. Meanwhile, no metastatic processes take place; if they do, they appear late and are not very extensive. Paturand and Wagner saw metastases in the other kidney, liver and lungs, Marchand and Geddings in the liver, Gairdner and Cohnheim in the other kidney, Sturm in the porta hepatis, Elben in the pleura. But rarely a lymphatic gland is affected, at all events none outside the mesentery, and then only in the immediate vicinity of the tumor. The only influence on the growth of neighboring organs is found in the condition of the other kidney, which, when not subject to sarcomatous degeneration, is liable to become hypertrophied and not infrequently secretes urine to an amount sufficient for both kidneys. It is not always the kidney which is the original seat of the tumor; it originates often in the cellular tissue of the hilus, but kidney and tumor are always enveloped in a dense hard capsule, which it is easy to peel off. The kidney was found separate from the tumor by Schneller, Eve (twice), Abercrombie (three times), Brosin, Day, Eberth, Little, Gairdner. More or less normal kidney tissue is mentioned by Elben, Marchand, Landsberger, van der Byl, Baginsky, Ferréol, Fotherby, Cohnheim, Jacobi.

The ureter is often traced into the centre of the mass, or into a cystic space representing, perhaps, the pelvis. It is often dilated.

Hæmaturia has been observed by Paturand, Gay, Baginsky, Berner, Elben, and on the last day of life by Gairdner. Thus it is certainly very much less frequent than in the alleged cases of carcinoma of the kidney, 66 per cent. of which are said to have exhibited that symptom. Without blood, albumen is found but rarely.

The tumor is not painful either spontaneously or on pressure. But it becomes so when complicated with, or giving rise to, peritonitis, pleuritis, pleuropneumonia. Nor is it attended with fever unless the latter depends on

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those complications. In that case adhesions may be found with the liver, diaphragm, stomach, intestines, mesentery, spleen, or the retroperitoneal connective tissue. Such adhesions are mentioned by van der Byl, Gairdner, Gay, Baginsky, Marchand, Jacobi. Peritonitis is a frequent complication, parenchymatous nephritis has been met with by Abercrombie, ascites and anasarca by Stedman, pleuropneumonia by Jacobi. The suprarenal capsules were found normal by Abercrombie.⁵

The microscopical examination of the tumor reveals more or less round cells, spindle-shaped cells, elongated spindle-shaped cells with transverse stripes (Cohnheim's and Bostrom's cases, also those of Marchand, Langhans, Kocher), real muscular fibres, thinner though than those of the voluntary muscles, and without sarcolemma, and nuclei attached rather more to the walls of the fibres than enclosed in their midst (as in the cases of Eberth, Cohnheim, Landsberger, two of Eve, Jacobi, Marchand, Kocher, Williams and Brosin. Further, leucocytes and proliferating endothelia of the lymph-ducts, connective tissue and elastic tissue. The stroma consists of connective and in many cases of such muscular tissue as described above. The latter is not in connection with anything outside the tumor from which it could take its immediate origin. Its vascular condition varies as above stated.

⁵ The suprarenal capsules have been made the subject of very suggestive remarks on their connection with renal tumors, by Grawitz. He often found brown nodi and noduli, sometimes of the size of the suprarenal capsules, on the surface, or extending into the tissue, of a kidney. Their cells are frequently found to contain fat globules exactly as the tumors of the suprarenal capsules. He suggests that these tumors result from particles of the suprarenal capsules dislodged during early embryonic life when the kidney was still composed of isolated small bodies. From this early period it is that these tumors take their origin which are found imbedded into the cortical substance. These tumors, it is true, are mostly lipomata and "adenomata," with a tendency to undergo myxomatous degeneration and to give rise to hemorrhages. However, the probability that sarcomata of the renal surface, and in the surrounding connective tissue should now and then be traced to the same origin, cannot be denied.

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As stated above, some of the renal sarcomata are external to the kidneys, they compress the latter by increasing bulk and dislodge them mostly posteriorly and upwards. Some grow into the tissue of the kidneys, into the pelvis in the case of Eberth. Such may take place, when it originates in the capsule as in Hüter's case. In others the destruction of the kidney tissue has advanced to such a degree as to leave but traces of the kidneys, as in the cases of Cohnheim, Marshall, Ferréol, Baginsky and two of mine. In Landsberger's case both kidneys were destroyed.

Sarcoma of the kidney may be mistaken for carcinoma or hydronephrosis, for an ovarian cyst, a large extraperitoneal abscess of the abdominal wall, or psoas abscess, peritonitic exudations, enlarged spleen, tumor of mesenteric glands. As long as it is of moderate size it is confined to the renal and lumbar region. There is increased dullness in the normal position; between it and the spleen, or liver, there is a zone of tympanites, its consistency and shape are as described above. Now and then an intestinal convolution can be diagnosticated to cross it, vertically; in most cases, however, it is so much compressed as to escape notice. It is true that now and then peritonitic tumors are large and deceiving, but in most cases there is a history of peritonitis, and the masses are flatter and more cakelike than the massive spheroid kidney. Local phlegmone may render a case doubtful, but hardly for a long time. If there be a doubt between sarcoma and hydronephrosis, a puncture is permissible. The liquid of a sarcoma cyst is but rarely like the serum contained in a hydronephrosis. Under all circumstances, a puncture is permissible. In many cases the dark or viscid liquid of the sarcoma cysts contains material from which to form a diagnosis. Harpooning also ought to be allowed, as I have done it in several instances, to set the question of the nature of the tumor at rest. It is the more advisable when the tumor is large, and the boundaries between it and the neighboring organs are no longer marked by a tympanitic zone or discovered by palpation.

There is one peculiar symptom, I believe, of great im-

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portance. In no cases of any kind have I found such a distinct sensation of semifluctuation as over large sarcomata containing no cyst. I may be mistaken in its bearing; but it has not easily deceived me in the cases in which I have employed the test. It is found, I think it necessary to repeat it, over those in which there are no cysts, but the structure of the sarcoma is uniformly consistent, and more or less solid. Paul and Williams allude to this symptom also. Actual fluctuation, as mentioned by Berner, Baginsky, Little and Jacobi, is found over large cysts only.

Is there any treatment?

Now and henceforth the diagnosis will be made before it is too late to act. When but one kidney is affected, its removal ought to be proposed. This may prove the more successful the smaller and more moveable the tumor still happens to be, and the better the general health, and the less complication with peritonitis, and consecutive adhesions. Laparotomy is no longer a fatal operation. In a case reported by P. Wagner, of laparotomy undertaken for the purpose of removing a kidney, the adhesions were found to be so many and firm that the operation could not be completed. Still the child, a girl of four years, recovered from the operation perfectly and quickly. (*Arch klin. Chir.* 1884. vol. XXX.) A case of Czerny's, reported by Braun (*D. med. Woch.* 31. 1881), of adenoma of the left kidney in a patient of eleven months of age, survived the operation quite well, but died of peritonitis on the third day. The case of Kocher's related above, terminated fatally from causes which in the opinion of the surgeon himself, ought to have been prevented. Hieguets case of renal sarcoma recovered after nephrectomy. In the *Chir. Centr.* bl. 1879 reference is made to a case of Jessop's, of "carcinoma" of the kidney, occurring in a child of two and a half years, who is reported to have been alive four years after the operation. Thus, enough is known of nephrectomy performed after laparotomy to justify the operation for the removal of a renal sarcoma. Without it, this affection is certain to prove fatal in every instance sooner or later.

Sometimes very late indeed. For the treatment with arsenic yields a fair success in the average cases of lymph-

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omata and sarcomata. More, it is true, in the former, but also in the latter. After a huge mass of sarcomata of the right side of the neck had been removed by the knife, in a boy of three years, a year previously, and when the tumor was nearly restored to the size of almost a child's head by steady growth on the part of the returning neoplasms, the administration of arsenic, in slowly but steadily increasing doses, reduced the size and almost removed the last trace of the glandular sarcoma. The improvement was as steady as the growth had been, the first improvement showing itself in this, that gradually, instead of a large uniform mass, the isolated glands would become perceptible, and these finally also diminished in size and immovability. I may add, however, that in no case have I succeeded in averting the final fatal termination. The patient would succumb to the influence on the part of general nutrition, of the (Hodgkin's) universal lymphomatosis or sarcomatosis. In regard to subcutaneous injections I desire to say that carefully filtered solutions of arsenic preparations are well tolerated. After arsenical injections into the mass of neoplasms, of mesenteric glands, spleen and kidneys, I have met, however, in a few instances, with abscesses or irritative processes.

The internal administration in these cases ought to be graduated very carefully. It is well to dilute largely, for instance: Rp. Sol. Potass. ars. Fowler. 5,0. Aq. d. 75,0, three doses of which are to be taken in such a manner that the first is one-half of a teaspoonful (to be taken after a meal, in from 25 to 50 grammes of water), and an additional drop is given with every succeeding dose in such a manner, that at the end of the tenth day the dose amounts to one teaspoonful. In this way the dose can be increased considerably, and will be well tolerated.

The object of this paper was twofold. The narration of my four cases appeared to me a sufficient reason why for a brief time I might wish to claim your attention. I am sorry to say, that of a few more cases identified post-mortem I have no notes and cannot therefore count or reason upon them. More than these I have seen, I know

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and have stated before, but have not verified them by longer observation and post-mortem examination. After all, however, I felt for many years justified in both believing and teaching that primary sarcoma of the kidney of the young was not at all uncommon, at all events more frequent than primary carcinoma. Of the latter I have seen but two cases of which I have preserved notes. Both of them have been for the first time mentioned in a paper of Dr. Seibert's on hæmaturia in renal carcinoma of the young in a late number of the *Jahrb. f. Kinderheilkunde*⁶. But when I came to study the literature, I felt there must be a mistake somewhere. That I should have seen as many cases myself, as were contained in the whole literature of the subject appeared very improbable. It struck me that many cases of alleged carcinoma were indeed sarcoma, and I believe I have proven that such is the case in some. Besides, even the very best literature of modern time, with the exception of but few instances, made no difference between carcinoma and sarcoma. Thus it was necessary to differentiate between the two both for theoretical and practical reasons. For even he, who would not venture to operate for carcinoma, would be induced to remove a sarcomatous kidney; thus the early diagnosis is of the greatest possible importance; and the fact which I think is now proven, that sarcoma of the infant kidney is quite a frequent occurrence will contribute to facilitating the diagnosis in many a case.

The literature I have collected proves that it has been observed and described in forty-two cases. I may add that in a recent conversation with Prof. Greenfield of Edinburgh I learned that he possessed the specimens of five sarcomata of the kidney of the young. And Prof. Hensen, of Kiel, also expressed his conviction that sarcoma of the kidney in the young was by no means so rare as reputed. Thus, I hope I have contributed somewhat to settle a question which has undoubtedly a great scientific importance, and not a slight bearing upon practice.

⁶ The name of the author has been misspelled "Leibert."

EXTRACRANIAL ANEURYSM IN EARLY LIFE

IN the Transactions of the first meeting of the American Pediatric Society, held in Washington, D. C., on the 20th and 21st days of September, 1889, I presented the history of an aneurysm of the abdominal aorta, observed in a girl of five years.

It was furnished to me by Charles F. C. Lehlbach, of Newark, New Jersey, and reads as follows in his own words:

"The patient from whom the specimen was taken died in Dr. E. J. Ill's private hospital, at Newark, New Jersey, July 8, 1887, of acute tubercular meningitis, at the age of five years and three months.

"Parental history.—Her parents were both dead. Her mother had died, October 13, 1885, at the age of thirty years, of pulmonary phthisis, probably tubercular, after a succession of preceding illness covering a period of sixteen months,—namely: measles, subacute bronchial catarrh, an intercurrent abdominal typhoid fever of severe type, with intestinal hemorrhages, followed by chronic interstitial pneumonia, with undoubtedly final tubercular infiltration. She was a woman of delicate build and poor nutrition, though her parents are yet both living.

"The father—a physician in very active practice—died at the age of thirty-six years, five months later (February 27, 1886), of acute tubercular meningitis, nine days after a first initiatory general convulsion, followed by delirium and coma. His general health had been poor on account of overwork in practice and domestic cares, caused by the sickness of his wife. During the preceding year he had been troubled more or less with attacks of arthritis, mainly in the right wrist and elbow, supposed to be rheumatic, but probably tubercular. His only previous illness of any importance had been right-sided pleurisy, eight years be-

fore, resulting in adhesions, without crippling the lung seriously. Besides the tubercular meningitis, which the autopsy showed, moderate tubercular infiltration, particularly of the right apex, was also found. His parents had both died within the preceding three years,—the father of heart-failure (chronic valvular disease and hypertrophy), the mother of cerebral apoplexy (fulminant).

“Patient’s history.—With the exception of pertussis and measles, which the patient had successively gone through within the winter of 1883-84, and from which she fully recovered, although of slight build and delicate osseous and muscular development, nothing pathological occurred in her history until the latter part of the summer (August and September, 1886), six months after the death of her father, while spending a season with the family of her aunt at the sea-shore.

“On one occasion, after running and jumping, she suddenly complained of severe pain in the right leg, which, being looked upon as caused by a sprain, was treated by rest and liniments. She recovered from the effects of this, apparently, in a few weeks. But later on, after the family’s return home, she was noticed occasionally to limp and to complain of pain in the leg. At this time no shortening or change of position of the limb was apparent; but it was thought best to keep her at perfect rest in bed, and later, in November and December, she was placed in extension. Examination under full anæsthesia failed to disclose positive evidence of destructive hip-joint disease.

“As the little patient became very restless in bed, and the pain had markedly subsided, it was thought proper to give a trial by allowing her to sit up in easy-chairs, after removing the extension. A few weeks’ freedom, limited, however, to sitting up in the room, was followed by some increase of pain, slight eversion of the limb, with apparent shortening, and a certain amount of puffiness of the hip-joint. She was then placed a second time in a permanent recumbent position with extension, and while under anæsthesia, manipulation of the limb showed neither crepitation nor roughness of the articulating surfaces.

“She remained in the extension apparatus, with counter-

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irritation around the joint, roborating treatment, and good diet, until sometime in April, when shortening and eversion became more marked, when the weights were temporarily removed, and the question of excision of the joint came up.

"Dr. A. Jacobi was called in consultation, the patient once more placed under an anæsthetic, and this time, on rotating and pushing the femur up towards the acetabulum, distinct crepitation was detected, leaving no longer any doubt of the existence of destructive coxitis. It must be remarked here that no marked elevation of temperature had been observed during the progress of the disease.

"Excision of the joint having been decided upon, as giving the patient the only chance for an approximately useful limb, and perhaps life, the operation was performed by Dr. E. J. Ill, of Newark, in his private hospital, April 23, 1887. The destruction of bone was much further advanced than had been suspected. All of the head of the femur had been destroyed, with the neck and the larger trochanter; there was little pus; the acetabular surface in its greater extent was smooth and healthy, and only towards the lower and outer border felt roughened; the roughness, however, was fibrous, and not that of necrotic or carious bone. After removal of all the diseased portion of bone, the cavity left was thoroughly washed out with an antiseptic solution, packed with iodoform gauze, and she was placed once more in fixed extension.

"From this time on to within less than a week before the child's death, on July 8, 1887, the case was one of unbroken favorable progress. The shock of and reaction from the operation were almost nil. There was very little rise of temperature during the first two days, and none subsequently; what little secretion the wound cavity showed at the various dressings, was inodorous, and healthy granulations soon commenced to fill up the acetabular bottom of the wound, the end of the femur became covered by smooth granulations, so that at the end of eight weeks, the wound having almost closed, the little patient, when the weights were removed, took delight in showing how she could move the leg. She was moderately encouraged in this in order

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to induce the quicker formation of a serviceable artificial joint.

"About five days before death she commenced to complain of severe pain in the left epigastric region, of a colicky character, and intermittent; there was no rise of temperature, and the bowels were freely open. On deep palpation an indefinite tumescence could be felt in the left epigastrium, with more or less distinctness, at various examinations.

"This state of things continued up to forty-eight hours before death, when, suddenly, without any premonitory symptoms of cerebral trouble, she was seized with general convulsions, lasting from ten to fifteen minutes, from which she recovered gradually to complete consciousness, but complaining of much headache. This was followed by rise of temperature the next day, and the recurrence of four more convulsions up to the time of death, with increasing headache during the intervals, the last convulsion being quickly followed by coma and death. The urine had been normal.

"Autopsy made by Dr. E. J. Ill in my presence.

"There being, in our opinion, no doubt whatever that the cause of death was tubercular meningitis, the brain, under the peculiar circumstances surrounding the case, was not examined. The main object was to inspect the reparative process in the joint, to examine the lungs and heart, and to find, if possible, an explanation of the tumescence in the left epigastrium, the seat of the severe pain before the occurrence of the fatal convulsions.

"The reparative process in the joint had been remarkably complete. The acetabular cavity had filled up completely, the femoral covering smoothly, and the formation of an artificial joint with good socket was certainly only a matter of time, had the patient lived.

"The heart was found healthy, free from endocardial or valvular lesions.

"The apices of both lungs presented several areas of disseminated miliary tubercles.

"On removing the abdominal integuments and the overlying intestines, a tumor was readily felt and seen at a

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point corresponding to the tumescence, noticeable on deep palpation during life, and, on its removal, it was found to be aneurysmal, involving the abdominal aorta.

“Circumstances did not permit any further and more minute examination.”

From a letter of Dr. Lehlbach's, dated October 9, 1888, I quote the following remarks:

“There is hardly a doubt as to the nature of the hip-disease of the little patient. It was certainly tubercular, for there were tubercles in the lungs also. By what road, however, bacilli entered the abdominal aorta is problematical for the present. The occurrence of parasitical (also tubercular) aneurysms has been demonstrated by Hans Eppinger in his ‘Pathogenesis of Aneurysms’ (Langenbeck's *Arch. für klin. Chir.*, XXXV., Suppl.). But all of his observations refer to aneurysms by erosion, in the closest proximity to cavities, where the migration of bacilli took place from the pulmonary tissue into the structure of the blood-vessels. I have not succeeded in finding among the cases recorded by Eppinger a single one similar to mine, always provided that this was also of tubercular nature.”

The modern literature on the subject of aneurysm in the young is but scanty. In 1884 (*Med.-Chir. Trans.*, vol. LXVII.), R. W. Parker collected fifteen extracranial cases. Sanné reported from literature three cases of aneurysm of the aorta and atheromatous degeneration of the aorta in the young (*Revue mens. des. mal. de l'enfance*, February, 1887), and added a new one, in a girl of thirteen years. The latter, and ten more from literature, are enumerated by N. N. Keen (“Two Cases of Aneurysm in Girls of Eighteen and Eight Years of Age,” *Med. News*, December 24, 1887), who thus swells the number of cases of extracranial aneurysms to twenty-eight. Lehlbach's case, so graphically described by him in the above history, is the twenty-ninth.

The cases of aneurysmal dilatation, which is never the result of mere increased blood pressure alone, may be various. In the case of Hutchinson (*Trans. Pathol. Soc. of London*, p. 104, Keen), the cause was an abscess. The

patient was a girl of four years, who suffered from an aneurysm of the arch of the aorta. No prior symptoms of aneurysm. Child died, after ten days' illness, of acute pericarditis. Mr. Hutchinson believed that the aneurysm originated as an abscess, and had ulcerated into the vessel. The lining membrane of the aorta was smooth and perfectly up to the edges of the orifice of communication (one-fourth by one-eighth of an inch) with the sac. This was the size of two chestnuts placed side by side, and hung from the arch of the aorta into the pericardium, compressing somewhat the pulmonary artery. The heart was normal, but in the lungs were tubercles, with chalky concretions in the bronchial glands.

Another cause is embolism, depending on valvular disease. Of this nature was Langton and Bowlby's case (*Brit. Med. Jour.*, 1886, 11, p. 103). The patient, a girl of twenty, had ulcerous endocarditis, an aneurysm of the right carotid, emboli and aneurysms in brain, trunk, and extremities. Many of Parker's cases are of this character.

The connection between embolism and aneurysm occasioned by spontaneous ruptures caused P. K. Pel (*Zeitschr. f. klin. Med.*, XII, 1887, p. 327), to refer to a case published by Tuffnell (*Dublin Quarterly*, XV, May, 1853). It was observed in a person of twenty-five years who suffered simultaneously from cauliflower excrescences and an aneurysm of the popliteal artery. In the same way John W. Ogle (*Med. T. and Gaz.*, 1866, I., p. 164), explained the presence of aneurysms in young persons suffering from endocarditis verrucosa, by the occurrence of embolic processes. So does Ponfick (*Virch. Arch.*, LVIII, p. 528, 1873). With Eppinger (*Pathogenese, Histogenese und Aetiologie der Aneurysmen*), who published his researches on the 562 pages of the third and fourth fascicles of Langenbeck's *Arch. f. klin. Chir.*, 1887, the embolic origin of aneurysm on mycotic basis is not doubtful at all. These aneurysms were all of them multiple and localized mostly near bifurcations of blood-vessels. Only a few weeks ago O. von Büngner (*Arch. f. klin. Chir.*, 40, 1890, p. 312), published a case of aneurysm (the thirtieth) in the left femoral artery connected with a so-called spon-

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taneous rupture. The patient was a boy of seventeen years who had suffered from serious attacks of polyarthritis when eight, thirteen, and sixteen years old. A serious cardiac disease was the result. In the middle of May, 1888, there was a sudden appearance of a swelling below Poupart's ligament in the left side. The diagnosis made a short time afterwards was: Mitral incompetency, aneurysma spurium of the left femoral artery, and incipient gangrene of the fourth and fifth toes of the left foot. When the autopsy was made, there was a tear in the wall of the artery, with irregular outlines. It was surrounded by a moderate thickening of the adjoining wall. In the upper angle of the wound there was a tongue-shaped protrusion with a small coagulation of blood. The aorta and the axillary, brachial, radial, ulnar, iliac, popliteal, tibial, subclavian and carotid arteries were all uncommonly narrow.

The third is endarteritis, as in Moutard-Martin's case, which occurred in a boy of two years, who had an atheromatous arch and a hypertrophied heart. Such occurrences are extremely rare. Under the heading of periarteritis nodosa, Kussmaul and R. Maier described (*Arch. f. klin. Med.*, I., p. 484), certain multiple degenerations of the arteries. Their case was observed and examined at a time when no other cases had been treated with equal care. They took the little swellings for nodules of connective tissue, and thus came to the conclusion that they had to deal with a new form of periarteritis. Eppinger draws attention to the fact that a number of these nodules are distinctly described as being hollow, and is undoubtedly correct in ranging their case among those (few of which have been hitherto observed) of multiple aneurysmal degeneration. Of the same nature was a case of P. Meyer (*Virch. Arch.*, LXXIV., p. 277), and that of Weichselbaum and Chvostek (*Allg. N. Med. Zeitschr.*, 1877, No. 28).

Congenital incompetency of the walls of blood-vessels is another cause of aneurysmal dilatation. Voigtel insisted first on this connection, Cruveilhier described a case of cirroid aneurysm depending on congenital thinness of

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the tunica media, and refers to the fact that sometimes a thin artery cannot be diagnosticated from a vein. Virchow explained the most persistent and incurable cases of chlorosis by the thinness and smallness of the arteries, and met with a case of simple dilatation of the blood-vessels of the pia mater and consequent aneurysm which depended on atrophy of the media.

Klebs observed thin vessels in a dropsical child of thirty-two weeks, and C. O. Weber, Balassa, and Yull refer to the influence of congenital atrophy and debility of the arterial walls. Finally, the case of hereditary cerebral hemorrhage observed by Dicuiafof (*Gaz. Hebdom.*, 1877, Nos. 16 and 18) is apt to illustrate the influence of the original structures on the formation of pathological conditions.

It is to this class that belong the anatomical alterations of the elastic tissue in the walls of the arteries.

Eppinger's researches are contained in a special part of his "Pathogenesis of Aneurisms," and reports among many other cases the following new one:

"A girl of ten years died in 1875, in the St. Anne Children's hospital, with the symptoms of universal marasmus. No syphilis. There were no remarkable anomalies of any organ, with the exception of the heart. It showed a very large number of aneurysms, hundreds of which—up to a width of four millim., with either large or small orifices—originated all along the walls of the right and left coronary arteries with all its very smallest ramifications. The intercostal arteries were in the same condition."

His microscopical examinations have led to very remarkable results. He found that even every nodulated thickening, or apparent thickening, of the walls of the small arteries was indeed a true aneurysm. These were not always of the same description. The elastic tissue was abruptly torn, the muscular layer also more or less extensively, and the two joining each other or rolled up into each other in the most various ways. In the wall of an aneurysm thus formed not a trace of either muscular or elastic tissue can be found. That wall consists of the thickened intima and the adventitia closely attached to it.

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Now and then aneurysms were found at the bifurcation of arteries, so that it consisted of both a dilatation of the artery and a branch. Almost all these aneurysms had a centrifugal development,—that is, they were developed and enlarged in the direction of the circulation. In some the muscular layer did not stop abruptly, it grew gradually thinner, and exhibited granular degeneration, but the main part of the aneurysm consisted of the intima and adventitia. Whenever all of the arterial layers were intact, there never was a dilatation, but only when either the elastic or the elastic and muscular layers were absent.

This condition of things is found exclusively in the arteries of medium or of small size. In them the elastic layer consists of a uniform and thin mass; in the large arteries, however, the elastic membrane extends into the other layers. It is a noteworthy fact that the aneurysms referred to occurred mostly on bifurcations. It is here that the elastic membrane is thinned under ordinary circumstances.

A fifth cause of aneurysm is to be found in morbid histological alterations of the blood-vessel walls.

P. Meyer published a series of careful investigations, mostly made on the pulmonary artery (in Recklinghausen's laboratory), on "the formation and significance of hyalin in aneurisms and the blood-vessels."¹ That name—hyaline—was given by Recklinghausen to a substance which is believed to originate in a metamorphosis of the protoplasm of the cells. It is homogeneous, refracts the light strongly, and is mostly penetrated by a network of fine canaliculi, or by irregular fissures and lacunæ. It is identical with what Langhans described under the name of "canalized fibrin" in the placenta, its origin is attributed to a transformation of the white thrombus. It is true that Auerbach and others deny the existence of this substance, but Meyer claimed to have found it in a case of periarteritis nodosa.²

In order to study the aneurysms of the pulmonary artery, he made fine sections through the blood-vessels pro-

¹ Arch. de Physiol., 2. sér, VII. (4), p. 598, 1880; Schmidt's Jahrb., 1883, CC. 201.

² Virchow's Arch., LXXIV., p. 277.

truding into a pulmonary cavity, and examined the blood-vessels which were not changed at all, or but little. The principal alterations were met with in the media. It was absent in the aneurysmatic sac, present in the opposite wall, and gradually disappeared between the two. In the vessel the intima was hypertrophied; at the beginning of the dilatation it was covered by a thin and homogeneous layer, which showed a strong refraction of light and penetrated into the very tissue of the intima. In the convexity of the aneurysm itself the whole vessel had undergone that change; the hyaline substance being perforated by a net-work of canaliculi devoid of walls. The inner layers were of a looser consistency, the lacunæ being more irregular and exhibiting thrombotic deposits. Externally, the wall of the aneurysmatic sac thus altered, exhibited a gradual transition into the caseous granulation tissue which formed the wall of the cavity.

Adopting this theory of anatomical changes in the blood-vessel walls, as a predisposition to aneurysmal dilatation, Julius Hoffnung³ reports a case of aneurysm in a branch of the pulmonary artery in a girl of ten months, who died of hæmoptoë. The left lung adhered firmly to the costal pleura. During its removal the pulmonary pleura was torn about the middle of the lung, and a brownish-red fluid escaped. The upper lobe was solid with hepatization, the centre of which was formed by a caseous mass of the size of a hazel-nut. There was a cavity of the size of a pigeon's egg filled with the above-mentioned fluid. In that cavity there was a tumor of the size of a hazel-nut which proved to be an aneurysm of a branch of the pulmonary artery; it still contained a firm parietal thrombus which clung to its wall. The lower lobe of the lung was also hepatized.

F. Rasmussen⁴ had the care of a "very young" girl, who had pulmonary phthisis and died suddenly in an attack

³ "Ueber Hæmoptoë bei Kindern," Inaug. Diss., Berlin, 1885; E. Henoch, "Vorles. üb. Kinderkrankheiten," IV. Aufl., 1889, S. 412.

⁴ Hosp. Tidende XII., Nos. 11, 12; Nord. Medic. Archiv. 1, No. 12; Julius Hoffnung, p. 18; Virchow-Hirsch, Jahresber, 1869, 11., 101.

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of hemorrhage. All the healthy bronchi were obstructed by blood. A careful section of the lung revealed a very small cavity on the boundary line between the indurated and the aerated portion of the lung. A small artery followed the bronchus leading into the cavity; on the very spot where the artery was in contact with the wall of the cavity, a small aneurysm was found which was ruptured. In its interior was found a layer of an older coagulum which pressed into the rent.

The same author published the case of a boy of three and a half years who was known to be phthisical, and died suddenly of hemorrhage. The autopsy exhibited in the lungs a chronic interstitial and caseous pneumonia, peribronchitis, and miliary tubercles. There was an aneurysm of a branch of the pulmonary artery which had ruptured into a cavity. There were also miliary tubercles in the pleura, spleen, liver, and kidneys.

O. Wyss⁵ reports the case of a child of a little more than a year who was attended for diffuse capillary bronchitis with infiltration of the right apex. An emetic was administered. An attack of coughing followed the first vomiting, and with it a large amount of clear red blood was discharged through both nose and mouth.

Death was immediate. There was, in the right apex, a caseous "pneumonic" infiltration, in the centre of which was a cavity of the size of a walnut which communicated with a bronchus. Near by was found an aneurysm of a branch of the pulmonary artery, which had ruptured into the cavity.

Ch. West⁶ when reporting seven cases of fatal pulmonary hemorrhage in tuberculous children, three of whom were examined after death, found the cause of the hemorrhage in one. A cavity in the lower part of the right lower lobe was transversed by a vessel on which an aneurysm had formed of the size of a hazel-nut.⁷

⁵ B. Gerhardt, *Handb. d. Kinderh.*, 111 (2), S. 807.

⁶ *Lectures*, 7. ed. p. 531.

⁷ In "Zehnter Jahresbericht des Caroliner Kinderhospitals in Wien" für das Jahr 1889, S. 25, Dr. Rie published a case of aneurysm of the ascending aorta in a girl of five years. The child

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The following case of aneurysm (multiple) was met with in a girl of seven years, under the care of Granville M. Withe, M. D., of New York, who has secured the following facts relating to the history of the case.

The patient was Emily W., New York. Her father, mother, grand-parents, great-grandparents, uncles, aunts, great-uncles and great-aunts on both sides were more or less gouty or rheumatic. She had three brothers and one sister. Two brothers died under four years of age, one at an early age, "during dentition," the other at three years of diphtheria. One brother is living and in good health—one sister is also living and at present in good health. But at times she is afflicted with marked symptoms of gout, as shown by various articular, digestive, muscular, cutaneous and nervous symptoms, and the urine. She is four years of age.

Emily was a healthy child, well nourished and vigorous, up to the age of three years. At that time (summer of 1884) she had an attack of gastro-enteritis, and became so ill that it was deemed advisable to remove her from New York to Atlantic City, being carried on a pillow. There she regained strength rapidly, and soon was convalescent. Still, during that summer, she had repeated attacks of pain in muscles, swelling of joints, especially of the lower extremities, which were diagnosticated as "growing pains" by the local physician. On her return to New York in the autumn a well-marked vulvular lesion was made out by Dr. W. J. Swift, and her previous illness was considered to have been rheumathritis. From the autumn of 1884 to that of 1887 the child was apparently in good health. She was exceedingly active, both mentally and physically. Occasionally, however, she suffered from slight attacks of gastro-intestinal irritation accompanied by pain both in muscles and joints. In November, 1887, Dr. John J. Dare was called to attend the child while suffering was presented before the "Doctoren-Collegium" of Vienna on April 1. The location of dulness, the dislocation of the heart downwards, the peculiarity of the pulse permit of no doubt as to the correctness of the diagnosis. Thus Dr. Rie's case is the thirty-second now known.

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from a severe attack apparently of gastroenteritis. At this time patient complained bitterly of intense pains in right side and back, which were supposed to be due to intestinal colic, but of course were explained later by the occlusion of right ureter brought about by right external iliac aneurysm. The symptoms at this time were as follows: Daily rise of temperature in the afternoon, to 101—103° F. (38—39,5 C.), pain of a sharp shooting character in right epigastric region and back, pain in joints and muscles of the lower extremities and through right scapula. At times there would be a well-marked swelling of one or both great toes, accompanied by local heat, redness and great pain. At this time there was marked anæmia. In December, 1887, patient was seen by Dr. Wm. Polk in consultation; there was then no tumor, but in February, 1888, a small pulsating tumor was discovered in left femoral region. It was diagnosed as an aneurysm of the left femoral artery. Within two weeks another pulsating tumor was made out in the right inguinal region, which was diagnosed as an aneurysm of the right external iliac artery. At this time Drs. Stimson, Sands and Polk saw the case in consultation. Between November, 1887, and February, 1888, the child alternated between fair and good health. Now and then she would appear bright and full of animation, entering into sports with her playmates with enthusiasm and vigor; at other times she complained of pain in right side and back and suffered from gastro-intestinal symptoms. For a time she would take to her bed. Dr. Granville M. Withe was first called in on April 29, 1888, when he found the child confined to her bed suffering from intense pain in left side and back. The great toe and the joint of the right foot were swelled, red and very tender, and the bowels fairly loose and contained a considerable amount of sandy material which, however, was never carefully examined. The femoral and iliac aneurysms were well marked at this time, as was also the cardiac lesion. A well-marked murmur was transmitted down the whole length of the spine and the presence of an abdominal or thoracic aneurysm strongly suspected. Examination of urine negative, as on previous occasions. Digital compres-

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sion was kept up on femoral artery for twenty-four hours, and general treatment instituted. Patient improved somewhat until May 8, 1888, when she became affected with an extensive attack of diphtheria. Dr. A. Jacobi was immediately summoned by the Doctor's request, but the child died on the 13th of acute ulcerative endocarditis.

Report of autopsy, made by T. Mitchell A. Prudden, M.D., 20 hours after death

Slender-built girl, about seven years old, moderately well nourished, rigor mortis slight.

Brain—not examined.

Heart—moderate hypertrophy of left ventricular wall; circumscribed thickenings on all of the aortic cusps, small and old.

Mitral edges generally slightly thickened, chordæ tendineæ thickened and shortened.

On the upper surface and edges of both leaflets of the mitral were large, rough vegetations. One of these was about 5 mm. in diameter, the other about twice as large. These vegetations were in part firm and white, in part formed of fresh clot.

On the left front segment of the left auricle is a firm rough lobulated reddish white vegetation, about 1 cm. long and 4 mm. wide. Irregular patches of thickening in the left ventricle.

Microscopical examination shows that the general thickening of endocardium and valves is old; that the larger vegetations are fresh and in places crowded with colonies, masses and chains of micrococci.

The aorta is narrow, but otherwise normal. The coronary arteries are normal.

Trachea—normal.

Lungs—Left normal.

Right shows in upper lobe numerous dark red projecting areas of consolidation. Microscopical examination shows these to be fresh infarctions, presumably from emboli.

Intestines—apparently normal.

Spleen—moderately large. Trabeculæ distinct. Perisplenic patch and a large old infarction.

EXTRACRANIAL ANEURYSM IN EARLY LIFE

Liver—pale, apparently normal.

Kidneys—Left ureter normal. Kidney large, capsule free, cortex thick and pale. Several old white infarctions.

Right ureter dilated. Kidney small, pelvis and calices largely dilated, kidney tissue compressed and pale. The right ureter is compressed by the aneurysm of the iliac artery. Microscopic examination shows chronic diffuse nephritis.

Arteries—On the right external iliac artery, just below its junction with the internal iliac, is a thick-walled sacculated aneurysm 5 cm. long, 4 cm. wide and 3 cm. thick. It contains a moderately thick parietal clot.

On the right femoral artery, a short distance below Poupert's ligament, is a sacculated thick-walled aneurysm, 4 cm. long and 3 cm. wide and thick. This contains a large parietal clot, filling about two-thirds of its cavity.

The lumen of the femoral artery, for about 3 cm. below the aneurysm, is completely closed by a firm clot.

Organization has occurred at one point in the clot, so that the lumen is completely filled by a newly formed vascular tissue of loose texture.

The anatomical diagnosis is:—Old chronic endocarditis with infarctions in the kidney and spleen. Aneurysms of the right external iliac and femoral arteries, chronic diffuse nephritis with atrophy of right kidney from obstruction to ureter. Malignant ulcerative endocarditis with hemorrhagic infarctions in the right lung. Organized thrombus of femoral artery.



CERVICAL ADENITIS—ITS ETIOLOGY, SYMPTOMS AND DIAGNOSIS

THE great lymphatic trunks are three in number—the jugular, the subclavian, and the broncho-mediastinal. The first carries lymph from the head and neck; the second gathers that of the upper extremity and the anterior wall of the chest; and the third that of the lower extremities and the posterior part of thorax. On the left side of the body, the latter is represented by the thoracic duct, which attends to the collection of chyle and the rest of the lymph circulating in the abdominal and thoracic organs. These three trunks are usually but short, and discharge their contents, which float in the network of innumerable ducts, into the veins. Before so doing, they sometimes join, on either side, into a common lymphatic trunk. The innumerable lymph ducts which form the trunks have to pass the so-called lymphatic glands; such of these which are peripherous send their vasa efferentia into the inner tiers; thus the vas efferens of the superficial glands becomes the afferens of one more centrally located.

The subject of to-night's discussion is the jugular trunk. Its large number of lymph ducts, both small and large, superficial and deep-seated, form an incredibly complicated but still regular network, which is subdivided into two plexuses—the superficial or external, and the deep or internal jugular plexus. The first gathers the ducts distributed over the occipital, aural, and temporal regions. There are the occipital glands (one or two) near the linea nuchæ, the frequent seats of disease in erysipelas and phlegmon of vertex and occiput; near these are the posterior auricular glands, situated over the insertion of the sterno-cleido-muscle; with them combines a network of ducts originating in the territory of the facial veins. From two to four anterior auricular glands gather the lymph from the temporal re-

gions, and are located above and below the parotid. The submaxillary glands collect the lymph of the forehead, eyelids, surface of the nose, cheeks, lips and chin—indeed, all the surface parts of the face—also some of the cerebral portions, particularly the floor of the mouth, and part of the tongue. Here it is where the first deposits take place in epithelioma of the lip. Adjoining are two or three mental glands. To the same plexus belong five or six superficial cervical glands. They are covered by the platysma, lie on or behind the sterno-cleido-mastoid, and are intimately connected with the posterior auricular and the submaxillary glands. In them the lymph of the external ear and the skin of the throat and neck is collected, and many of the morbid processes take place in these superficial cervical glands.

The external and the internal jugular plexuses are, however, by no means strictly separated from each other. The latter receives the vasa efferentia of the superficial cervical glands, also the ducts of the central layers of the face with their four or six deep facial glands on the side of pharynx, also a number of the vasa efferentia of the submental glands. The deep-seated facial glands, three or six in number, are situated behind the buccinator muscle and alongside the pharynx. They receive the lymph of the temporal and speno-maxillary fossæ, of the orbit, the nares, the superior maxilla, palate and pharynx. To them belongs a gland first described by Tortual, which lies between the long muscle of the head (*longus capitis*) and the sulcus of the posterior wall of the pharynx. Some of the retro-pharyngeal abscesses result from its morbid changes.

The internal jugular plexus extends also along the large blood-vessels to the base of the skull, where it gathers the intra-cranial ducts. Its deep cervical glands, from ten to twenty in number, are distinguished as upper and lower—the latter being adjacent to and connected with the superficial cervical glands. The upper deep cervical glands collect the ducts of both pharynx and tongue, along which there are three or four lingual glands; also of the inner muscles of the neck, of larynx and thyroid gland.

The lingual glands receive most of the lymph from the

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tongue, the lower part of the pharynx, the deep muscles of the throat and neck, of the larynx and thyroid.

The lower deep-seated cervical glands are located in the supraclavicular space, on the brachial plexus and scalenus muscle, and extend as far as the axillary glands. Through the tier of the upper deep cervical glands they receive the lymph from the whole head and neck, and independently that of the lower part of the integuments of the skin, and of the muscles of the neck; of the lower part of the larynx, of the thyroid and of the trachea; of the lower part of the fauces and of the œsophagus, of the vertebral canal and posterior part of cranial cavity. They are intimately connected with the lymphatic glands of the axilla and of the thorax, and owe their peculiar pathological dignity to both the extent of their connection and communication, and their location behind and alongside the internal and the common jugular vein.

Curnow and Treves (quoted in Ashby's article on "Scrofulosis," in Keating's *Cyclopædia*, Vol. II), have the following table destined to show the relation of glands to the territories drained by them:

Suboccipital and mastoid: Posterior half of head.

Parotid lymphatic glands: Anterior half of head, orbits, nose, upper jaw, upper part of pharynx.

Submaxillary lymphatic glands: Lower gums, lower part of face, front of mouth and tongue.

Suprahypoid: Anterior part of tongue, chin, lower lip.

Superficial cervical (beneath platysma): External ear, side of head, neck and face.

Retropharyngeal: Nasal fossæ and upper part of pharynx.

Deep cervical (upper set along carotid sheath): Mouth, tonsils, palate, lower part of pharynx, larynx, posterior part of tongue, nasal fossæ, parotid, and submaxillary glands, interior of skull, deep parts of neck and head.

Deep cervical (lower set in supraclavicular fossæ): Drain upper set of lymph glands, lower part of neck, and join axillary and mediastinal glands.

I have spoken of the organs which form the subject of our discussion to-night as lymphatic glands. This is the term by which they are mostly known. If for our purpose

it were necessary, we might well question its appropriateness; for they are not glands, in the actual meaning of that term. They do not secrete, they are but receptacles, depots, hardly anything beyond that, and the term of lymph bodies is more accurate than that of lymphatic glands. Both of the terms, however, may be used in to-night's discussion.

The frequency of morbid changes in the lymph bodies is explained by the large amount of cells which form the bulk of their structure. They are still similar to the embryonic cells, increase and proliferate as rapidly, and therefore tumefactions are brought about readily. As a copious net of blood-vessels penetrates their follicular substance, they may undergo morbid changes through the intervention of the blood. When the latter is the cause of disease, the whole system of lymph bodies is liable to be affected simultaneously. This, however, is but an occasional occurrence. Indeed, in the majority of cases only groups of lymph bodies, or single lymph bodies, are affected. The cause of disease must, then, be looked for in the circulating lymph, which, both under normal and abnormal circumstances, is retained and filtered in the lymph spaces, which are not open tubes, but a fine net-work of cavities lined with endothelium. Foreign bodies of any description floating in the lymph are there retained and undergo changes. These, as also chemical changes of the lymph itself, irritate the lymph body and produce disease. Thus it is that but few morbid changes of the lymph bodies are primary, almost all of them are secondary.

These changes are mostly the result of, or complicated with, hyperæmia and inflammation. At once there is swelling and increasing consistency; in exceptional cases the tissue becomes softer. On section it shows hyperæmia, which may depend on either dilatation of the blood vessels, or the presence of a bloody serum, or hæmorrhages, or two or all of these conditions. The tumefaction of adjacent glands is sometimes such as to render the distinction of the single gland from each other an impossibility. Often they are flattened upon each other. Within the extended capsule the lymphoid cell constituents increase

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in different ways. Leucocytes are retained in large numbers, lymph cells continue to float in, a sub-division takes place, and the endothelia and nuclear cells undergo changes into similar or equal organic particles. This condition may undergo restitution, or a hyperplastic induration may take place through nuclear proliferation in the stroma. Besides, suppuration may occur, or necrosis. The fibrous induration is more frequently met with in the bronchial, tracheal, mesenteric, axillary and inguinal glands than in the cervical. In the inguinal it is very common—so common, indeed, that they are frequently seen at every age without any morbid symptoms. This change exhibits, in many cases, its chronic character from the very beginning. The glands are not always enlarged, they are white and hard on section; the capsule is thickened, the cell substance is diminished, the gland appears to consist, more or less, of connective tissue only.

The suppurative change may be confined to the gland, at least temporarily, or the neighboring tissues participate in the process at an early period. Small abscesses originate mostly in the follicular substance, prove confluent so as to form a larger abscess, and finally burst, or are incised. Recovery takes place by a shrinking process, by cicatrization, by the formation of a fistula, sometimes accompanied with lymphorrhœa, when larger lymph ducts happened to be injured, or by desiccation, caseation or calcification. This is the second form of chronicity.

The third series of chronic adenitis is the caseous. Its nature is that of an aseptic necrosis, mostly under the influence of scrofulous or tuberculous predisposition. Caseous adenitis is preferably found in the cervical, bronchial and mesenteric glands. Its incipient stage is hyperplasia; next, cell conglomeration in the lymph spaces; one of the final changes, through deposition of carbonate of calcium, either uniform or disseminated, calcification; another is softening, which, through absence of circulation and through the mutual compression of the crowding cell-material, begins in the center, but may succeed in perforating into neighboring cavities, such as trachea or veins. This simple caseation is often found by itself; sometimes, however, with

tubercular caseation, also with fibrous inflammation. If the latter be predominant, actual or apparent recovery may take place. The genuine tubercular caseation looks very much like the non-specific kind, but it exhibits tubercles consisting of either small, round, lymph-like, or flat epithelioid, or giant cells, or a mixture of all of them, which, when confluent, form larger or smaller masses, either coherent or isolated, in the follicular tissue. There they are easily recognized, unless hyaline or colloid transmutation have taken place.

The *etiology* of glandular tumefaction, both cervical and general, on the basis of hyperæmia or inflammation, has been mentioned before under two heads. General infection may act through the blood; thus in universal putrid and septic infection, in anthrax, lepra, leucocythæmia and pseudo-leucocythæmia, under the influence of Koch's lymph, in syphilic, also in enteric fever. In both of the latter, however, the local irritation results in local glandular affection, by preference. Still more local is the action of the diphtheria virus. An example of more general infection, or rather predisposition, is the peculiar fragility and inflammability of all the tissues which we are accustomed to call scrofulosis.

The large majority of cases of adenitis, both acute and chronic, however, owe their existence to a local influence. They are produced by morphological or chemical changes in the circulating lymph, which result in local irritation of the lymph spaces of the glands. That result is mostly an acute adenitis. This acute adenitis is liable to undergo resolution, as stated before. It is much more liable to become chronic, however, unless relieved in time; for actual hyperplasia, when the proliferated or conglomerated cell material, particularly of the stroma, has become organized, is not amenable to easy re-absorption. Or the adenitis becomes chronic from the beginning, when the cause acts gently but persistently. The final result may be exactly the same in both cases. Whether there are other influences predisposing to bring forth either the acute or the chronic form, such as a peculiar congenital or acquired tendency, amount of cell accumulation, disturbance of the morbid

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process, or interruption of the regressive change, can hardly be determined in the individual cases.

After all, most forms and cases of adenitis are of local origin; it is that local origin which has to be traced in every single case. In many, that study is very simple; in others, particularly in those which have lasted a long time, the connection of chronic adenitis with its original source is no longer traceable. In the child of advanced years and the adult, the history of chronic cervical tumefaction may, therefore, be quite obscure; in the infant and young child, the elucidation of the etiology is mostly easy.

According to all that has been said, chronic adenitis in all its forms may result from lesions of any kind. The best protection against it is normal health and the absence of any breaks in the integuments. It is through these latter that septic invasions will take place. Traumatism will produce adenitis directly—thus, a blow, a fall. But these cases are rare enough. Erysipelas has the same effect. Insect bites raise a glandular swelling immediately. The obstinate adenitis of the neck is often the result of pediculi, or of eczema, or impetigo capitis; heal these—contrary to the public prejudice—and most of the glandular noduli and nodi disappear spontaneously. Of aural diseases, it is the mastoid abscess and a simple aural catarrh which result in adenitis of long standing. The fibrous condition of the floor of the external ear is easily perforated by a suppurating gland underneath, and recovery is very slow unless a counter-incision be made into the very abscess. The eye is productive of chronic adenitis through conjunctivitis and corneal ulceration. Herpes zoster, always a local disease following the course of a nerve, is the cause of local adenitis; left frontal zoster in a boy of seven produced suppurative adenitis in front of the left ear, and protracted chronic induration of the glands near the angle of the lower jaw and under the chin; cervical zoster tumefies jugular and cervical glands; labial and mental zoster, the frequent form of so-called fever blisters, give rise to adenitis, both acute and chronic, sometimes characteristically unilateral. The nose is a frequent source of cervical adenitis; every ailment interfering with the

healthy condition of the mucous membranes gives rise to adenitis, from an innocent nasal catarrh to its consecutive ulcerations, from the lesions produced by a foreign body to the septic influence of diphtheria. A small number of cases of so-called scrofulous glands of the neck, for which the children had been punished with cod-liver oil, have been cured by the extraction of shoe buttons. No tot with a persistent running of the nose, not to speak of the danger incurred by the upholstered chairs and the trousers of the doctor, will escape its dozens of enlarged glands; they will be either prevented or mostly cured by keeping the nose clean with a physiological salt-water solution only, to the exclusion of everything else. It is a peculiar instance of specialistic oversight, that in a book on nasal diseases by Turasz, just published, no single mention is made of adenitis as a sequela of nasal catarrh. Boring in the nose, resulting from any irritation of the mucous membrane, for instance, from intestinal causes, with its local lesions, is productive of chronic adenitis. That is the explanation of the alleged connection of intestinal parasites with adenitis. Worms irritate, both by direct influence and reflex action, the mucous membrane; this is injured by the infant fingers, and the local lesion resulting therefrom produces the tumefaction of the glands.

There is perhaps no better illustration of the rapidity with which adenitis is apt to come and go, according to the neglect or treatment of the nose and naso-pharynx, than nasal diphtheria. There is nobody here but has met with those cases in which the cervical glands would swell within hours, within a day, to such an extent as to render the poor sufferer unrecognizable. These cases of nasal diphtheria were given up as lost twenty-five years ago. It is only since the connection of this ominous septic adenitis with its source in the nasal mucous membranes was fully recognized, and my demand to disinfect the nasal mucous membrane has become fully appreciated, that nasal diphtheria is no longer the absolutely fatal disease which it was believed to be. As fast as the glands swell under the influence of the septic poison, just as rapidly will they diminish in size under that of cleanli-

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ness and disinfection. If not so reduced, they will lead to death, or chronic changes. These latter are of different characters. Many will become hard and persist in that form; some few will suppurate in small multiple places, which may remain a long time undiscovered and unhealed. Altogether, however, suppuration is not so frequent in diphtheria as it is in other inflammatory or infectious diseases. In not a few cases of the severest types necrosis will be the termination of the acute swelling.

Cracked lips permit the invasion of microbes and the development of consequent adenitis; epithelioma influences the neighboring glands in the same way. Every form of stomatitis—the follicular, aphthous and parasitic, and the denuding of the surface by a burn (hot food included), have the same effect. The tongue is a frequent cause of adenitis, either through catarrh and inflammation, or the surface lesions in infectious diseases. There is no better protection to the system than intact integuments. The most injurious poisons, such as peptones and enzymes, are changed into albuminates in a healthy mucous membrane; but cracks and rents allow them to enter the circulation directly. Not only does such an occurrence take place in the stomach and intestine, but in the mouth and tongue. The cracked tongue of a typhoid patient is an inlet to micrococci of all sorts; it is they which destroy more patients than the original typhoid infection. The first to suffer are the neighboring lymphatic glands. They also suffer in general catarrhal and inflammatory angina, be it the result of an infection, or a foreign body, even a fish-bone; not so much in circumscribed affections of the tonsils, for these are so snugly surrounded by a solid fibrous capsule that an extensive lymph communication with the system is out of the question. Thus it happens that even in diphtheria, when it is limited to the tonsils, the glands swell but little if at all, and constitutional symptoms are but few, in contradistinction from deep-seated follicular, inflammatory, or suppurative amygdalitis, all of which produce an active fever and systemic disturbances. Partly through their influence on the surface, partly through their pharyngeal complications will

measles, scarlatina, and other infectious fevers affect the cervical glands.

Dentition, as long as it takes its physiological course, has no such influence, but as soon as the gums undergo a high degree of hyperæmia and irritation, the glands become affected; so they will from carious teeth, periostitis, osteomyelitis, or phosphorus necrosis; so also from the presence of parasites—for instance, the streptothrix of actinomyces. Through their irritating influence on the oral mucous membranes, drugs will have the same effect—for instance, mercury and iodine.

Vaccination, particularly when animal lymph was used according to Ashby, has been observed to result in cervical adenitis, even without much general disturbance. The axillary glands are in intimate connection with the cervical, which may swell with the former. Chronic bronchitis results in swelling of the mediastinal glands; their intimate connection with the lower tier of the cervical affects these; that observation can be made in those chronic bronchitides of the tubercular and rachitical babies in many instances; acute pulmonary diseases exhibit similar results. The vasomotor changes of the face, its local flush lasting for days, mostly unilateral on the side of an acute pneumonia, are well known; not so commonly known, however, is the tumefaction of cervical glands in cases of pleuro-pneumonia of the upper lobe. This disease has an immediate influence upon the intra-thoracic lymph bodies adjacent to the apices, and through them on the suprajacent cervical lymph bodies.

As the glandular tumefaction develops very fast, and an acute adenitis becomes chronic in the different ways alluded to before, as, moreover, the local irritation is by no means always arrested in the nearest gland, or group of glands, the cause of the morbid changes may disappear, may not even be remembered; but the result remains in the shape of either hyperplasia or chronic suppuration and cicatrization. The former condition is more frequently seen in advanced years, and in deep-seated glands which are least exposed to external injuries, than in the early period of life, and the glands near the surface.

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I shall close, Mr. President, with a few remarks referring to *diagnosis*.

Pus inside a gland is not always detected with ease, for the multiple abscesses are often but small. Though they melted together into a larger abscess, the presence or absence of fluctuation is liable to depend on the thickness and rigidity of the capsule. Now and then fluctuation is readily felt; if not, there is sometimes a circumscribed soft, small spot which can be discovered by steadilying the organ between two fingers of one hand and gently tapping on the suspended place with a finger of the other. Local pain is frequently absent. When, however, the neighboring organs participate in the process, and the skin becomes red and sensitive, the diagnosis is easy enough. The sensation of fluctuation, however, is often misleading. Large glands may be mistaken for sarcomata and *vice versa*. These latter pseudoplasms yield a peculiar apparent fluctuation, though there be no complication with cysts. This semi-fluctuation is almost characteristic for sarcomata in every region. I have described it in the fœtal and infant sarcomata of the kidney, in an essay which was published in the *Transactions of the Eighth International Congress of Copenhagen*, in 1884. In this connection I may add, that it may become altogether difficult to determine the exact nature of the glandular swelling. As I said before, the presence of pus cannot always be discovered at an early moment. Nobody can say, with positive certainty, when the first central softening takes place, nor to what extent there is, in an individual case, a mixture of the hyperplastic, cellular, or caseous, either simple or tubercular, elements. Still less is there an absolute certainty, in every case, of the presence or absence of a malignant nature in a large glandular swelling. The difficulty is so much the more comprehensive the greater the variety in the morphological diagnoses of the histologists; indeed, the application of the terms of lymphoma, adenoma and sarcoma is not identical with the different authors. Besides, the frequency of such terms as lymphadenoma, lymphosarcoma and adeno-sarcoma proves the impossibility of establishing fixed bound-

ary lines between the several forms. The gradual increase in size, however, without softening, speaks for the malignancy of the tumor; the presence of more swellings of the same character, in other parts of the body, either simultaneously or within a limited time, may prove the existence of Hodgkin's pseudoleucocythæmia, the same with the enlargement of spleen or liver and the characteristic changes of the blood that of leucocythæmia.

The diagnosis of glandular abscesses, to differentiate them from suppurations of other sources, is not always easy. There are retro- and latero-pharyngeal abscesses penetrating to the surface, those resulting from caries of the mastoid process, the vertical column, or the maxilla; those from the sternum and sternal junction of the clavicle which ascend along the sterno-mastoid muscle; those originating in a myositis of this muscle, or in a periostitis of the hyoid bone or perichondritis of the cricoid cartilage, or the rare cases of perforations upwards, of pulmonary cavities, or empyema; those rising from metastatic carcinomatous glands, or from old cicatricial tissue. All of them may test the observer's experience and dexterity. In a number of cases the diagnosis will be determined by the original localization of the swelling, or of the pain, if any there be, and by the first seat of secondary symptoms, such as difficulty of deglutition, respiration or muscular function.

CONTRIBUTIONS TO THE ANATOMY AND PATHOLOGY OF THE THYMUS GLAND

THE pathology of the thymus gland and its literature have been extensively discussed of late by Giuseppe Somma ("Sulla tracheostenosi per ipertrofia congenita del timo," in *Arch. di patol. inf.*, 1884, fasc. 4), and A. Sanné (Art. "Thymus," in *Dict. Encyclop. des sciences méd.*, 1887). Otherwise the literature of the thymus, for the last thirty years, since Alexander Friedleben published his exhaustive and brilliant monograph on "Die Physiologie der Thymusdrüse in Gesundheit und Krankheit vom Standpunkte experimenteller Forschung und Klinischer Erfahrung" (Frankfurt A. M., 1858), has been mostly confined to embryology and histology.

In the following pages, therefore, I venture to offer, with a few remarks and cases, the results of some researches into the anatomical relations, and some pathological conditions of the thymus. The specimens have been prepared and the microscopical examinations made by my young friend, Dr. Henry Koplik, mostly in the laboratory of the College of Physicians and Surgeons of New York. The anatomical material required came from several institutions of the city. It is mainly to the kindness of Dr. W. P. Northrup, of the Foundling Asylum, that I am indebted for most of the available cases, with the reports of both their autopsies and histories.

Of the whole number of cases, thirty-two were carefully examined. Amongst them there were four of tuberculosis, one of which was excluded because both the history of the case and the necropsy were incomplete. There were five cases of syphilis, one of which was thrown out because its history was defective. Three were fully examined. Of diphtheria there were many specimens; nine of them were also investigated with great care. Besides, there was a specimen of persistent thymus taken from an adult.

DR. JACOBI'S WORKS

Plates I.-VII. were taken from the frozen sections of a newly-born normal baby. They were made for the purpose of establishing the exact location of the thymus gland. All the sections were made one centimetre apart, with the exception of Plate II., which is but half a centimetre in thickness. The first and sixth sections exhibit the upper aspect. We look down upon it. In Plates II., III., IV., and V. we look up toward them. The plates are taken from the full sizes, the specimens having shrunk since, say, to five-sixths or seven-eighths of the original size.

DISEASES OF THE THYMUS

Friedleben's conclusions derived from the closest possible study of the whole literature, and many researches of his own, lead to the results that the diseases of the thymus are quite rare, and that the conditions of hyperæmia and apoplexy, besides those depending on violence experienced during parturition, and tuberculous degenerations, have indeed been met with, but very much more rarely than some authors had supposed them to occur. The large majority of observations alleged to be those of diseases of the thymus, were, according to him, no diseases of that or any other organ. He could not ascertain any positive symptoms during life belonging exclusively to such presumed diseases. There was but a single *abscess* of the thymus at this time, and that also exhibited no recognizable symptoms.

HYPERTROPHY

The existence of a hypertrophy of the thymus gland has often been both asserted and denied. It is a fact that its weight may vary between a few and nearly five hundred grains, without giving rise to any symptoms whatsoever. According to Friedleben, the thymus, both normal and abnormally large, cannot impede respiration or circulation, or irritate the respiratory nerves, or disturb the cerebral circulation or the innervation of the muscles controlling the glottis, or be subject to a periodic turgescence by impeded circulation. Before him, as early as 1847, Herard reported, in his inaugural thesis, "Du spasme de

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la glotte," his examinations of the thymus of sixty infants, particularly with regard to its weight. He found the weight very variable, and that it depended on the constitution of the infant, and the degree of its emaciation, but also came to the conclusion that the bulk would vary considerably both in a healthy condition and in what was called thymic asthma.

West admits the existence of thymic asthma, and reports a single case without attributing to it the same symptoms found in the common forms of spasm of the glottis.

Rilliet and Barthez look upon spasm of the glottis as a convulsive, not a compressive affection. Sanné also makes a difference between the convulsive and the compressive form, and expresses the opinion that when the degenerated thymus or lymphatic glands are sufficiently large to compress the trachea and the adjoining nerves, particularly the inferior laryngeal, the consequences differ from the symptoms of glottic spasm.

Now, the distance, in the skeleton of an infant of eight months, between the manubrium sterni and the vertebral column amounts to two centimeters. Thus it is clear that a thymus gland of the size reported above, particularly in cases of temporary congestion and swelling, is sufficient to fill the whole space, compress the neighboring organs, and result in death. Thus it is quite possible to explain an occasional case of sudden death, and the so-called thymic asthma by an hypertrophy of the thymus gland, though the large majority of cases of laryngismus stridulus or spasm of the glottis have to be explained by changes in the nerve centre. It ought to be taken as an established fact, that most cases are due to meningeal and encephalic hyperæmia and effusion resulting from the changes produced by general rhachitis.

Until about twenty years ago, the several forms of rhachitis were not frequent among us. Particularly rhachitical softening of the cranial bones ("craniotabes"), and its cerebral results, were quite rare. Laryngismus stridulus was quite uncommon. It is not difficult to find the reasons for this peculiar fact. At that time the number of very

poor people, with all the diseases of abject poverty, was quite small amongst us. Since that time the indiscriminate immigration of hundreds of thousands every year, of the lowest classes of all the nations of Europe, has greatly changed the average social and hygienic condition, and rhachitis has become quite frequent, with all its consequences. Thus it is that thymic asthma, or laryngismus, has become quite frequent amongst us, though certainly the sizes of the thymus glands have not increased.

Still, sudden deaths, resembling those published by Graewitz, have been observed in a very few instances. One of his cases was that of a child of eight months, who was found dead in bed, after having been in perfect health. At the post-mortem examination absolutely nothing was found to explain death, except a thymus of unusual size, which was flattened, and covered the larger part of the pericardium, and extended upward to an unusual degree in the direction of the thyroid gland.

The second was a babe of six months, in perfect health, which, while being carried on the arm of the father, was taken with an attack of dyspnœa, became cyanotic, and died in a few minutes. At the post-mortem it was found that there was a large amount of subcutaneous fatty tissue, and symptoms of rhachitis about the chest. The thorax was broad, and the abdomen somewhat inflated. The diaphragm reached upward to the fourth rib on both sides. The thymus was very large, its two lobes covering the larger part of the pericardium, and two processes reached upward to the thyroid gland. Longitudinally it measured seven and a half centimetres; over the pericardium it was more than six centimetres wide; its thickness was one and a half centimetres, with the exception of the region of the manubrium sterni, where the dorso-ventral diameter amounted to one and four-fifths centimetres. The tissue of the thymus was of a grayish-pink color, quite firm, and contained a great many punctated hemorrhages. There was a large amount of blood in the heart and the two venæ cavæ. The epiglottis was compressed from the two sides. The spleen was large, and the mesenteric glands were larger than normal.

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Goodhart (*Brit. Med. Journ.*, 1879) reports a case of enlargement of the thymus in an infant of eight months, in which suffocatory and epileptiform attacks proved fatal.

Clar (*Jahrb. f. Kinderh.*, 1858) relates eight observations of asthmatic attacks in children, explained by hypertrophied thymus glands. Two were girls of sixteen days and two months in whom death resulted from a sudden swelling of the organ. Two died of pulmonary catarrh which was increased by the hypertrophied gland. In a boy of one year and nine months, who suffered from croup, the introduction of the tracheotomy tube proved impossible from the same cause.

Amongst a great many cases of laryngismus stridulus, I have met with but a dozen sudden deaths. In but one of those which I could examine after death, I found the cerebral and meningeal changes of rhachitis insufficient to explain the fatal termination. In that one case the thymus of the baby (boy of six months) had a weight of four hundred and ten grains, and I felt justified in attributing the sudden death of the patient to the size of the thymus gland.

HEMORRHAGES

Hemorrhages into the tissue of the thymus, and into its capsule, mostly at its inner surface, are by no means rare. Scores of them, of the size of a pin's head and less, may be found in babies dying a few days after birth from, or with, disorders of the scarcely established circulation. Atelectasis, pneumonia, congenital heart diseases, will result in so much venous congestion as to burst numerous small blood-vessels in many organs, principally, but not essentially, of the thoracic cavity.

Péan (*Bull. Soc. Anat.*, 1857, vol. 32, p. 375) describes the case of a thymus very much enlarged, which had the appearance of spleen tissue and presented a number of hemorrhages, varying in size from that of a pin's head to that of a grain of oats. The specimen was taken from an infant who died with hemorrhagic purpura at the age of eleven months.

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CYSTS

Bednar met with cysts containing a clear yellowish serum. Some had the size of beans, some were quite large and replaced the lobes of the organ. Were they the results of softened gummata? or not, rather, the results of hæmatomata changed in the manner in which they will be transformed, in the cranial cavity, into pachymeningeal cysts.

INFLAMMATION

Inflammations of the thymus have been described, but it has been found impossible to distinguish them from their complications. Thus E. Lancereaux (*Traité d'Anatomie Pathol.*, ii., p. 628) speaks of exudative, suppurative, hypertrophic, tuberculous, and syphilitic inflammations. Two cases of inflammation of the capsules of the thymus have come under my observation, but neither of them was primary. One of them appeared to be secondary to a general mediastinitis and pericarditis. The capsule was very hyperæmic, thickened, and fibrinous deposits were found on it.

The second case was one in which there was a considerable amount of fibrinous pleuritis on both sides. The capsule of the thymus was thickened, covered with thick layers of fibrin, was easily peeled off the organ; the latter was hyperæmic, and contained a few punctated hemorrhages. In this case there were in the neighborhood a considerable number of enlarged mediastinal glands.

It is the opinion also of Sanné that inflammations of the organ and its capsule are mostly not of a primary character, but the results of difficulties experienced during parturition, and generally attended with hyperæmia, œdema, and hemorrhages in other places. Similar cases have been mentioned by Veron, Billard, and Weber.

Wittich (*Virchow's Arch.*, viii., p. 477, 1855) reports the case of a young man of eighteen, who complained a long time of a retro-sternal pain and intense dyspnœa, particularly when in the recumbent position. After having suffered several months, he was admitted to the hospital, where he died, in an attack of suffocation, with hydro-

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thorax and ascites. There was found at the autopsy bilateral pleurisy with bloody and serous effusion; no tuberculosis; plenty of adhesions; in the left upper lobe, emphysema, in the left lower lobes, atelectasis; the external layer of the pericardium considerably thickened and discolored by pigment. The pericardium at its base was seven inches wide, its height from four to five inches. There was a large tumor which contained some normal tissue of the thymus gland, some cavities filled with pus and surrounded by a hyperæmic zone, other cavities filled with serum, pigmented granulations, and some fat. It could not be separated from the pericardium, the large blood-vessels, and the trachea. Even in this case it is very difficult to say whether the tumor was primary or not, for it is possible that it originated in the pericardium, the external layer of which was affected, or that it was the result of progressive mediastinitis.

MALIGNANT TUMORS

The case of primary *medullary sarcoma* reported by Astley Cooper in a girl of nineteen years is considered as extremely doubtful by Friedleben. Birch-Hirschfeld, however, expresses the opinion that many of the tumors of the anterior mediastinum originate in the thymus.

Steudener (*Virch. Arch.*, vol. 59, p. 463, 1874) reports the case of a child of one year, who died of pneumonia of the right lung. There had been no symptoms previously, but there was found a *hemorrhagic sarcoma* consisting of round cells which originated in the thymus, perforated its capsule in different places, and adhered to the large blood-vessels.

Soderbaum and Hedenius published, in 1878, the case of a man of twenty-two who had been suffering for some time, without a diagnosis of his condition having been made. He had a mild attack of pleurisy and cough, both of which disappeared, but a certain degree of dyspnœa remained, increased gradually, particularly in certain positions. After a while there was œdema of the upper part of the body. There were no attacks of suffocation, but dyspnœa increased, and he died nineteen months after

admission. There was a tumor of the thymus quite circumscribed, surrounded by signs of mild vascular irritation, compressing to a certain extent the neighboring blood-vessels and bronchi. It consisted of two parts, the anterior portion containing a large amount of fat and lymph elements, epithelial cells, and the characteristic concentric bodies of the thymus gland. The posterior part contained connective tissue cells in various degrees of development.

Vogel observed two boys of from five to six years of age with a *carcinoma* which, to judge from the position of the tumors, originated probably in the thymus gland.

T. Grützner published in 1869 (*Berlin Inaug. Diss.*) the case of a boy of eight years, whose family history was good, who died with a large tumor, diagnosed post-mortem as a lymphosarcoma. Immense masses of cells were accumulated in the reticulated connective tissue. Its origin was assumed to be the thymus gland, for the main bulk was uniform in both its texture and outlines, and did not make the impression of a conglomerate of enlarged and degenerated lymph bodies.

One of two cases described by Rosenberg (*Inaug. Dissert.*, Gottingen, 1884) was that of a boy of five years, who died with a lymphadenoma filling the whole mediastinum. It was closely adherent to the sternum, extended into the right pleural cavity, and was strongly adherent to the lower anterior part of the right upper lobe. It was assumed to be thymic, because no trace of the thymus could be found. Besides, it was homogeneous in its structure and not nodulated like a conglomerate of lymphomata, and was located in front of the pericardium, behind the sternum.

S. Bollag reports (*Inaug. Diss.*, Brugg., 1887) a lymphosarcoma of the thymus, observed in a boy of fourteen years, who died in the University Hospital of Zurich in 1883. It was located in the mediastinum, originated in the thymus, and resulted in secondary sarcomatous, degeneration of the lymph bodies and the parietal pericardium. Moreover, there were hemorrhagic pericarditis, compression of the trachea and of the vena cava superior. There were, in consequence, extensive œdema, bilateral hydro-

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thorax, compression of the lower parts of the lungs, protrusion of the sternum, and dislocation of the liver.

Jules Simon has collected, in his inaugural thesis, a few cases of enlarged thymus implicating *leucocythæmia*. One such case has been detailed by Augustin Fabre ("Fragments de clinique méd.," Paris, 1881). The leucocythæmia was both splenic and lymphatic. There were pleurisy of the left side, œdema of the left upper extremity, considerable dilatation of the veins of the thoracic wall and of the left shoulder. The only symptom perceptible during life was extensive dulness over the manubrium sterni. The latter was the only symptom distinguishable in the single case of the kind that has been observed by me. A child of two years had dyspnœa, dilated veins, œdema of the face and neck, and a high degree of anæmia. The tumor was taken for a mediastinal growth. The diagnosis of leucocythæmia was made, fortunately, before death, when the spleen was found greatly enlarged. The thymus was changed into a lymphosarcoma, and some of the mediastinal glands were altered in the same manner.

PERSISTENT THYMUS

Persistent thymus has been described occasionally, thus, for instance, by Alexander Bruce ("Specimens of thymus remaining to a later period of life than normal," in *Trans. Pathol. Soc.*, 1867, vol. xviii, p. 263). Before him, Haugsted observed a persistent thymus in a boy and girl of ten years, and a young man of seventeen, and Krause, in two men of twenty-five years, and in a woman of twenty-eight. Though there be a number of other observations of the kind, the examination of a case of persistent thymus which came under our notice will be found interesting.

Persistent Thymus in the Adult.—The above was removed from the body of a male, aged twenty-six years, the cause of whose death seemed to be unknown. At least, no positive lesion was found post-mortem. Dr. Van Gieson, of the Pathological Laboratory of the College of Physicians and Surgeons, of New York, furnished this specimen and kindly allowed us to make sections and study the same.

When found, it appeared as a small, pinkish tumor in the anterior mediastinum in front of the pericardium. It weighed, when hardened, 11.50 grammes. Macroscopically it appeared, on section, to be composed of yellowish, firm islets of tissue, separated by tissue less firm and more whitish in color.

When double-stained the above firmer areas (lobules) must be recognized as the remains of the thymus parenchyma; they were surrounded by fibular connective tissue from which trabeculae were given off dividing these areas after the manner of acini or follicles. The tissue in these areas was composed of a mass of small and large round cells. In spots there were spindle-shaped cells, the whole having a finely fibrillated basement-substance.

The small round cells were so closely packed as quite to conceal the basement-substance. The whole was much firmer than generally normal to the thymus. In the midst of the acini were met the characteristic concentric bodies found in the normal thymus. Some of these showed calcific changes, others still maintained their characters of a capsule with concentrically arranged layers of epithelioid cells.

The blood-vessels of smaller size in the acini were in places found to have undergone obliterating changes. In some places the coats were infiltrated with round and spindle-shaped cells. The lumen was filled with connective tissue.

The tissue between the above-described areas was in every way identical with adult fat tissue (see Plate VIII.).

Diagnosis.—The connective tissue originally separating the acini of the thymus was replaced by fat tissue. The parenchyma could be distinctly seen to have yielded to the invasion of fat tissue. In places only a small area of round cells (appearing as if they infiltrated the fat tissue) was all that remained of the original acinus of the thymus. The characters of the above persistent areas correspond to the picture given in the normal thymus, allowing for physiological changes.

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TUBERCULOSIS OF THE THYMUS GLAND

The literature of tuberculosis of the thymus gland is quite scanty. Indeed, there is hardly any. In the *Études expér. et clin. sur la tuberculose*, published under the direction of Prof. Verneuil (1887 and 1888), it is not even mentioned. The second edition of H. Hérard, V. Cornil, and V. Hanot's *La phthisie pulmonaire* (1888) contains a few remarks on tuberculosis of the thyroid body, but no mention is made of that of the thymus. And A. Predöhl's *History of Tuberculosis* (Hamburg and Leipzig, 1888), refers to no instance of tuberculosis of the thymus besides the case reported by Demme, to which I shall allude below.

Sanné quotes Harder, who describes a blackish and indurated thymus in a boy of fifteen years, who died of consumption; and Budæus, with the report of a man who died at thirty-two years of age, with an enlarged and "scirrhus" thymus. But most of the old observations suffer from insufficient observation and examination.

It appears that mistakes in regard to the diagnosis of tuberculous changes in the thymus gland are quite possible. The neighboring lymph bodies are certainly much more liable to undergo tuberculosis than the thymus. Probably the case of primary invasion claimed by Bednar (*Die Krankh. d. Neugeb. u. Säugl.*, 1857, p. 94) to have taken place in the thymus, means, indeed, a tuberculous swelling of an adjoining gland. I have met with exactly such cases, in which the thymus was reduced to a very small size by being compressed by a large tuberculous tumor in the neighborhood. In such a case the atrophy can be so considerable that nothing appears to remain but a thick layer of capsular tissue closely adhering to the tumor. Still, Vogel and Bednar report the observation of large "tubercular" tumors without any tumefaction of the neighboring glands.

There is but a single well-authenticated case of isolated primary tuberculosis of the thymus in modern literature. It is that of R. Demme, published in the *Twenty-second Annual Report of the Children's Hospital in Bern*, 1885. The case is that of a newly-born male, the child of non-

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tuberculous parents. He weighed 2780 grammes at birth, and was nursed at the breast of the mother for three weeks; afterward, on cow's milk. From that time on he became emaciated, suffered from diarrhœa, and showed all the symptoms of general debility; there was absolutely no physical symptoms except some dulness on percussion over the manubrium sterni, until he died on the forty-second day. The thymus was found to be quite large, and its tissue dense. In it there were three tubercles of the size of a pea each, and one of the size of a hazelnut. In these tumors some tubercle bacilli were found. In no other organ were there any tubercles or cheesy degenerations.

CASE I.—*General tuberculosis; meningitis*.—Joseph B., aged seven and a half months.

January 27, 1888. Returned to asylum from his private domicile. Has been restless for three days; obstinate constipation. Temperature $99\frac{1}{2}^{\circ}$.

28th. Temperature 102° ; evening 104° . Respiration irregular. Sordes on lips; fontanelle elevated; abdomen retracted; reflexes good. No convulsions; neck not stiff. Pupils not dilated; respond to light. No cough. Inclined to stupor. Quiet at night. Restless last night and this A. M. Is teething.

29th. No constipation. Temperature 100° , pulse 130, respiration Cheyne-Stokes. Eyeballs twitching; eyes half closed. Face flushed. *Tâche cerebrale* absent.

30th. Stupid. Dulness at upper part left side. Pupils slightly contracted; conjunctivæ congested. Marked Cheyne-Stokes respiration. Temperature 103° , pulse 196. Eruption over abdomen. No convulsions; neck stiff. P. M. temperature $107\frac{1}{2}^{\circ}$. Died 10 P. M.

Autopsy. 31st, 1 P. M.—Body well nourished; fontanelles elevated.

Brain. Ventricles much distended by serous fluid (5üij). Convolutions flattened. Fine tubercles everywhere along vessels and over base; also choroid plexus; œdema and infiltration of pia mater at base.

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Spinal Cord. Tubercles on dura.

Lungs. Adhesions at left apex, and beneath is a fluctuating cavity filled with pus and detritus. Scattered miliary tubercles over surface and on left pleura and left diaphragmatic pleura.

Bronchial glands enlarged; tubercular; some cheesy. Liver not large; miliary tubercles discrete. Spleen not large; miliary tubercles discrete. Kidneys, miliary tubercles discrete. Mesenteric glands moderately enlarged; miliary tubercles. Heart, normal. Heart, 3j; liver, 3vijss; spleen, 3vss.

The portion of the thymus which was hardened in alcohol and was taken from the anterior aspect of the organ, contained an area of grayish-white color more compact than the remainder of the thymus tissue. This area (measuring five mm. by two mm.) occupied that portion of the thymus anteriorly just beneath the capsule, but in the tissue substance proper of the thymus.

Sections stained with hematoxylon and eosin and picrocarmine showed that it was wholly made up of a number of miliary tubercles (a recent eruption) taking up the whole space allotted to an acinus of the thymus. Each tubercle granulum consisted of a giant cell, around which were arranged spheroidal and polygonal cells. There was no area of cheesy degeneration seen. The spaces between these formations were filled with small round cells.

The walls of the smaller and medium-sized arteries, both in the above area and in the neighboring acini of the thymus, were the seat of an endarteritis of a tubercular character.

The adventitia and media were infiltrated with round cells; the lumina of the smaller vessels were obliterated. In some cases the lumen was replaced by a mass of small round cells. The septa of the thymus in different parts of the organ were infiltrated with tubercle tissue, and the vessels of small calibre were also the seat of tubercular changes.

Tubercle bacilli were found in the giant cells of the miliary tubercles, in the centre and periphery of the tubercle granula, in the spaces between the cells of the

tubercle. They were present also in the walls of the blood vessels which were the seat of endarteritis. They were found in the lumina of some of these vessels. They existed in the connective-tissue septa separating the acini of the thymus, which septa may be the seat of an infiltration of tubercle tissue. In this thymus tubercle bacilli were found in those encapsulated nests of epithelioid cells which exist in the thymus and are characteristic of its structure. Here the tubercle bacilli were seen in the connective-tissue capsule and between the cells in the interior of these bodies. This was the case in the acini, the seat of eruption of miliary tubercle, and also in places quite distant from the same. Tubercle bacilli were found between the lymphoid cells (in lymph spaces) of the thymus, quite distant from the miliary tubercle in acini apparently not yet the seat of infiltration with tubercle tissue.

CASE II. *General tuberculosis*.—Jennie A., aged eight months and nineteen days. Entered asylum June 10, 1887, three weeks old. Condition poor. Had snuffles. Wet-nursed up to January 24, 1888, when she was returned from boarding; then bottle-fed. Condition: Emaciated; enlarged cervical glands; did not improve. Died February 8, 1888, 10 A. M.

Autopsy. Feb. 8, 2.30 P. M.—Body poorly nourished. Right lung: tubercles; also over right pleura, along posterior margin. Bronchial glands lying against right lung are tuberculous. Left lung and pleura normal. Mesenteric glands enlarged; one tuberculous. Agminated glands of intestine enlarged. Liver and spleen tuberculous. Kidneys normal. Body, 8½ pounds; liver, 5viij 5ivss; spleen, 5ivss; heart, 5vijss; thymus, 5j grs. xvijj.

The thymus was hardened in Müller's fluid and alcohol. On cutting the thymus two nodules of a cheesy character, on close examination, were found in the lateral portion of the organ and within its structure. One of these nodules was quite large, the size of a bean, the other much smaller. Under the microscope, the above nodules were found to have a large, cheesy centre, and a periphery composed of a number of tubercle granula, which contained giant cells, around which were found spheroidal or polygonal cells,

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both small and large; between these granula were small and large polygonal cells (tubercle tissue). The nodules were limited to a sort of connective-tissue capsule which belonged doubtless to the limiting connective-tissue septa of the acini of the thymus.

In some of the tubercle granula above mentioned there were cheesy areas (coagulation-necrosis). The septa limiting the acini in various parts of the thymus were infiltrated with tubercle tissue. The blood vessels of smaller size in these situations were the seat of an endarteritis of a tubercular nature. The adventitia and media of some of the medium-sized vessels were in a state of hyaline change, and infiltrated with small round or spheroidal cells. In some places the smaller arteries were obliterated, the lumen having been replaced by spheroidal or epithelioid cells.

Sections of the thymus were placed in alcohol, and stained by the Koch-Ehrlich method, both double and single stain. Tubercle bacilli appeared in the areas of coagulation-necrosis, in the tubercle granula, both at their centres and peripheries. The walls of the blood vessels were the seats of tubercular endarteritis. Tubercle bacilli were present in the tubercle tissue infiltrating the septa of the thymus in various parts of its extent. There were tubercle bacilli in places within the acini apparently free from the presence of any distinct tubercle formation. The bacilli were situated in the spaces between the lymphoid cells of the thymus.

CASE III. *General tuberculosis; convulsions.*—Marion W., aged four months January 17th, put out to wet-nurse; nurse's health failed; then bottle-fed after the middle of February. April 17th: Slight cough; constipated; head retracted; slight convulsive twitchings. 19th: Quieter; green undigested passages. Returned on April 25th in convulsion; collapse followed. Died on April 26th, at 1 A. M.

Autopsy. 2 P. M.—Body well nourished. Brain normal. Double broncho-pneumonia, chiefly on right side; some tubercles; bronchial and tracheal glands enlarged, cheesy. Tubercles in *pleura, liver and spleen*. Kidney markings

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slightly indistinct. Mesenteric glands enlarged. Intestines pale, empty (from oil and injections). Peyer's patches enlarged. Body, $12\frac{1}{2}$ pounds; heart, $\bar{5}j$ $\bar{5}vls$; liver, $\bar{5}vij$ $\bar{5}ij$; spleen, $\bar{5}ijss$; thymus, $\bar{5}ij$ grs. xj.

The thymus was hardened in Müller's fluid, and portions in alcohol. The organ showed on section the presence of a number of small grayish-white bodies occupying the anterior portion of the thymus. The tissue between these bodies (miliary tubercles) appeared denser and darker in color than normal. On microscopical examination, these bodies were found to be an eruption of miliary tubercles. These were composed entirely of small round or polygonal cells; at the centre of some of these collections or areas there were cheesy changes (coagulation-necrosis). In the periphery of these miliary tubercles the basement-substance showed fully well as a fine reticulated tissue forming spaces in which the round cells were found in other cases empty (per drawing). The tissue between the miliary tubercles was composed of round cells closely packed, in no way differing from the normal lymphoid cells of the thymus. They were more numerous, however. The smaller blood vessels in but very few instances could be found the seat of endarteritis.

A careful examination found tubercle bacilli (as in drawing) in *moderate* numbers in the cheesy centres, and in the periphery of the miliary tubercles, and also present in the tissue between the miliary tubercles.

METHODS OF INVESTIGATION.—The hardening fluids used were Müller's fluid and alcohol, simple alcohol, corrosive sublimate, chromic acid (one-half per cent.). Those portions of the thymus which were hardened in corrosive sublimate at a temperature of about 48° C. (118° F.) for nearly fifteen minutes and then placed in alcohol, first dilute and then strong, became quite brittle, and though they cut fairly well, they stained very badly with hæmatoxylin and eosin, or picro-carmin. The most satisfactory methods were alcohol or Müller's fluid. Paraffine and celloidin were used as embedding material, the latter in most cases. For tubercle bacilli, the methods recommended by Koch in his laboratory, and the modifications of the same

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by Ehrlich were made use of—methyl-violet, fuchsin, and Bismarck-brown being used either singly or conjointly; the sections being decolorized always in nitric acid, as recommended by Koch.

In simple staining, the fluids used were hæmatoxylin (Delafield) with eosin, carmine, picro-carmine, safranin, methyl-violet, fuchsin.

Specimens were always studied in both glycerine and balsam.

CONCLUSIONS.—In the cases of tuberculosis of the thymus here presented, tubercle tissue appeared in the following forms:

1. As miliary tubercles, composed entirely of small round or polygonal cells with a reticulated basement-substance in the recent state.

2. In the later stages, these miliary tubercles or granula may, at their centres, undergo cheesy metamorphosis (coagulation-necrosis).

3. Miliary granula are also found which show, in their centres, the presence of giant cells.

4. Large cheesy areas, in the periphery of which we find still miliary tubercles or granula composed of giant cells, around which are arranged spheroidal or polygonal cells in a fine reticulated basement-substance.

5. In all cases the arteries of the adjacent areas of the thymus tissue were the seat of a typical endarteritis (in some cases obliterating) of a tubercular character.

6. A very careful and painstaking examination of the above forms of tuberculosis of the thymus showed that the bacillus tuberculosis was present in all cases. In most of the above forms we had also the presence of the bacillus in the walls of the arteries and arterioles undergoing tubercular changes, and also in the lumen of the vessels with more or less obliterating changes.

7. In the thymus, tuberculosis may appear simply as so-called tubercle tissue, an infiltration of the tissue of the gland or organ with spheroidal or polygonal cells held together by a delicate basement-substance; this tissue has no characteristic arrangement; the arteries in such areas may be the seat of obliterating processes, and in all the

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cases examined by us there were present the characteristic bacillus tuberculosis.

DIPHTHERIA OF THE THYMUS

The thymus glands from nine cases of diphtheria were examined. They were cases of diphtheria of the fauces, or larynx; and in all of them the diphtheria was extensive, and in some was accompanied by broncho-pneumonia. Autopsy, as can be seen in the histories, showed enlarged bronchial and cervical lymphatic glands. The methods of study in all of these cases was the same, on the whole, as that pursued in the cases of tuberculosis. In only two cases were any marked changes found. In the remaining cases the changes from the normal were not evident on microscopical examination. In the thymus from which Plate XIII. was made, the appearances sketched were scattered in small areas throughout the thymus. These areas were less consistent, and when hardened it was more difficult to obtain sections of them than of the rest of the organ.

Though the thymus was well hardened, the portions in which the picture (Plate XIII.) was duplicated seemed to be undergoing a beginning disintegration. The other case in which similar appearances were found was a severe fatal diphtheria with sepsis at the umbilicus.

The appearances are as follows:

In the medullary portion, or sometimes the zone of the cortical portion of an acinus bordering on the medullary portion, there were found irregularly shaped areas, of a structure distinctly different from that found normally, and staining differently with hæmatoxylin or fuchsin from the surrounding tissue. With hæmatoxylin and eosin they stained of a dirty pink hue.

These areas were distinctly bounded by a narrow zone of small round cells, not differing in any way from the lymphoid cells commonly found in the normal thymus. The areas themselves consisted of irregular, large, coarsely granular cells, resembling large epithelial cells; between these were small round cells, granular detritus, and free large, irregularly shaped nuclei.

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In these areas blood vessels were distinct. Some cells contained more than one nucleus, others showed the nuclei irregularly shaped or constricted. Some of the cells contained large vacuoles. Making due allowance for the effects of hardening fluids, it was difficult not to surmise that some of these queer-shaped nuclei were the effect of a beginning process of division (karyokinesis). The blood vessels showed no changes.

These areas were very plentiful in this thymus. The thymus, on the whole, reminded one very much of the pictures given by Oertel of changes in the lymphatic glands in cases of diphtheria (necrobiosis), though not so advanced as in the cases examined and pictured by him.

One of the cases examined was that of a newly born infant. I give a few particulars because of the comparative infrequency of diphtheria of the newly born.

CASE IV. *Diphtheria; sepsis*.—Hilda Myers, born February 28, 1888. Mother showed signs of septic infection March 3, followed by pelvic abscess.

March 5. Child. Umbilicus, redness size of a silver dollar. Infiltration extending nearly to ensiform appendix and pubes. Slightly bloody mucous discharge from the nose. Pulse 90.

6th; A. M. Infiltration decreasing, softening of the right side nearly to umbilicus. Throat red, no exudation. Pulse 100. P. M. White patches on the tonsils and pharynx. Pulse 90.

7th. Exudation in the throat increased. Pulse, A. M., 100; P. M., 96. Respiration, A. M., 40; P. M., 40.

8th. Does not swell. Cyanosis marked at times. Respiration irregular. Infiltration extended over abdomen. Pulse, A. M., 100; P. M., 112. Respiration, A. M., 40; P. M., 40.

9th. Died 6.30 A. M.

In this case the temperature ranged from $99\frac{1}{2}^{\circ}$ March 5th, to 104° March 6th; it then dropped to $99\frac{3}{4}^{\circ}$ March 7th, A. M. It rose again to $102\frac{3}{4}^{\circ}$ March 8th A. M., then dropped suddenly to 97° , the temperature at time of death.

CASE V. *Diphtheria with nephritis and convulsions*.—Frederick S., aged three years, twenty-two days. Re-

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turned from boarding April 16th. Soon appeared ill; some amygdalitis.

April 22. Hoarse, slight cough.

26th. Tonsils very large. Membrane over tonsils and pharynx. Swelling of the cervical glands.

28th. Has steadily grown worse in the throat and general condition. 4 A. M., convulsions. 4.30 A. M., died.

Autopsy. *28th*, 1.30 P. M.—Body well nourished. Pericardial fluid red, but no blood corpuscles to be found.

Tonsils the seat of diphtheria; sloughing, membrane in pharynx, œsophagus and larynx and trachea. Catarrhal bronchitis; a good deal of pus. No pneumonia.

Liver fatty.

Bronchial glands enlarged.

Kidneys, markings indistinct, cortex swollen, pale. Urine (P. M.), granular and hyaline casts.

Body, 25 pounds; heart, 5ij 5iiiiss; liver, lb.j 5viiij; spleen, 5ij 5viiss; thymus, 5iij gr. iiij.

SYPHILIS

Parrot, who had an extensive experience in syphilis, and for that reason and because he was rather given to overestimating the ravages of that disease than otherwise (according to him, rhachitis is a disorder derived from hereditary syphilis), cannot be expected to have overlooked it where present, denies ever having met with syphilis in the thymus. The reddish or yellowish nodules he often found in it consisted of connective tissue undergoing fatty degeneration in the normal process of retrogressive metamorphosis. L. Fürth, however, found seven cases of thymus, which he claimed as syphilitic, in two hundred autopsies made on infants who died with congenital syphilis. In such cases the occurrence of tangible changes, such as gummata, is not required. The characteristic changes of the blood vessels, which may terminate in vascular obstruction, or in hemorrhages, are sufficient to establish the diagnosis.

There are two cases of hemorrhage of the thymus gland in the *Archiv für Kinderheilkunde*, vol. 4, p. 21, 1883. In one case the mother was known to be syphilitic. The child

ANATOMY AND PATHOLOGY OF THE THYMUS

developed normally for forty-five days, with the exception of a cephalhæmatoma and a smooth nævus on the abdomen. On the forty-fifth day it was suddenly taken ill. There was no albuminuria, but the epithelial "pearls" on the hard palate were found to be stained with blood. Thus the infant died. The left lobe of the thymus was enlarged. Near its hilus was a triangular area of whitish tissue, adjacent to which the tissue was tinged with blood and of a grayish-red color. On its edges the tissue was very smooth and purple. There was blood in the pleural cavities, and recent coagulations in the temporal and occipital fossæ of the cranium.

In the second case the mother was unknown; the baby developed normally until the tenth day. At that early age there were some symptoms of rhachitis. Besides, there were irregular, contracted cicatrices on the skin. The left lobe of the thymus was quite large. In it there was a hemorrhage of the size of a walnut. In the surrounding cellular tissue and on the hard palate there were punctated hemorrhages. There was blood in the stomach and on the surface of the kidneys.

Similar cases are reported by F. Weber in the thymus of the fœtus and the newly born, and there were found general hyperæmia, hemorrhages of the size of a pin and upward; besides, there were hemorrhages in other places, isolated, or a great many in the same locality.

Abscesses of the thymus depending on primary inflammation appear to be very rare. Normally, there are sometimes found accumulations of a milky fluid which is, or may have been, taken for pus. In the large majority of cases in which abscess has been reported, there is also the history of a constitutional disorder. Paul Dubois published a report of four syphilitic fœtuses with disseminated deposits of pus in the thymus gland. Haugsted has the report of two young men, syphilitic and tuberculous, in whose thymuses, which were persistent, pus is said to have been found. Mewis (*Zeitsch. f. Geburtsh. u. Gyn.*, 1879, iv., p. 57) has the following cases: one was that of a fœtus stillborn in the eight month of utero-gestation. The mother was reported to have been in good health, but

in the centre of the placenta there were several firm yellowish nodules of the size of a hazel-nut or less. In the fœtus there were gummata of the lungs, liver and spleen were enlarged, the pancreas was indurated, the mesenteric glands large, and there was found a syphilitic ostitis. There were also a discoloration and a swelling, sometimes amounting to stenosis, of the intima of the veins and arteries, such as are found in syphilis. The thymus was of its normal size, its tissue denser than normal, containing an abscess. No pustular syphilides.

The second was a male fœtus born dead at the end of the eighth month. The history of the mother pointed to syphilis, and in the fœtus there were syphilitic pemphigus, gummata in the lungs, spleen large, pancreas large and indurated, suprarenal capsules large and hemorrhagic. There was syphilitic ostitis. The thymus was large, contained a large number of small abscesses of the size of a pea, with pus of yellowish-green color and thick consistency. Similar observations had been made by Zeissl in cases complicated with syphilitic pustules.

The following cases of ours were examined:

CASE VI. *Congenital syphilis; broncho-pneumonia*.—Josephine C., aged three months and three weeks. Admitted November 2, 1887, when three weeks old. Was then in poor condition; conjunctivitis (syphilis?). Returned from boarding January 9, 1888. Emaciated; liver enlarged; spleen slightly enlarged; snuffles; enlarged cervical glands. Continued to fail; died February 2, 1888.

Autopsy. Feb. 2, 1 P. M.—Body poorly nourished; broncho-pneumonia left lower lobe; cervical glands enlarged; liver enlarged; spleen slightly enlarged; bronchial glands enlarged. Body, $6\frac{3}{4}$ pounds; heart, 5v; liver, 5vj 5ij; spleen, 5vss; thymus, 5ss.

CASE VII. *Congenital syphilis; enteritis*.—Arthur W., admitted January 30th, aged two months. Sore mouth; ulcers about genitals; snuffles. Syphilis? Bottle-fed; failed.

Feb. 13. Stupid, slight cough, neck stiff, enlarged inguinal and cervical glands.

14th. Pulse 160; temp. 102° ; diarrhœa; pupils contracted.

ANATOMY AND PATHOLOGY OF THE THYMUS

15th. Some symptoms of meningitis. Abdomen retracted, flabby, doughy; neck stiff and held back, slight spasmodic action of arms, but respiration regular, 23. Pulse 132; temp. $99\frac{1}{2}^{\circ}$; passed a little blood with stool yesterday.

16th. Died at 3 A. M.

Autopsy. 2 P. M.—Body very poorly nourished; lungs negative. Bronchial glands not enlarged. Mesenteric glands slightly enlarged, not tubercular. Inguinal and cervical glands as above. Brain normal. Intestines: contents thin and watery with mucus. Body, $6\frac{1}{2}$ pounds; heart, 5v; spleen, 5iijss; liver, 5iv 5j; thymus, grs. lxiv.

In this thymus the following growth was found. Microscopically it appeared as a spheroidal mass one and a half mm. in diameter, grayish-yellow in color. It was limited by a distinct zone, which under the microscope was composed of fibrillar connective tissue in which were spindle-shaped and round cells. The central portion of the mass consisted of a hyaline area occupying from one-third to one-half the diameter of the growth. This hyaline mass stained diffusely with eosin and hæmatoxylin, and contained a few oval nuclei situated at the sides of empty oblong spaces; these spaces, which were non-communicating, contained in places detritus. The nuclei and spaces indicated capillaries which were now almost obliterated by this process of hyaline degeneration. Around this central hyaline mass and occupying the space between it and the connective-tissue limiting zone, was a mass of spheroidal cells among which were very thin-walled vessels.

In places where the small round cells were not so compact a transparent reticulum containing spindle-shaped cells could be made out. The above round cells were smaller and stained more deeply with hæmatoxylin than those in the acini of the thymus.

Diagnosis.—In the absence of any positive presence of a similar growth in other parts of the body, the nature of the above can only be surmised. Tuberculosis being excluded, the assumption that the above is a gumma in process of formation appears plausible.

The sections show in places an absence of that distinct

marking into follicles seen in the thymus. In other places these markings are distinct, though fading off into the surrounding connective tissue. This changed appearance is caused by the presence of an excessive amount of connective tissue as compared with the parenchyma.

The parenchyma is much reduced by the encroachments of the connective tissue. This connective tissue when stained appears more transparent than the fibrillated connective tissue in other parts of the organs, where the markings of the acini are still distinct. The encroachments of connective tissue are first seen in the cortical part of the follicle. This connective tissue, apparently of recent formation, is composed of a transparent, finely fibrillated basement-substance containing spindle-shaped and round cells.

Fat tissue is present to a marked degree in the midst of the parenchyma of the acini.

The blood vessels show similar changes to those seen in another case.

CASE VIII. *Congenital anasarca; syphilis(?)*.—James D., seven months' miscarriage; lived fifteen months. Mother had severe albuminuria and miscarriage as above, 3 A. M., February 29th; child lived fifteen minutes, and breathed eight or ten times. Placenta pale (œdema?). Abdomen greatly distended; anasarca neonati.

Autopsy. Feb. 29, 2 P. M.—Abdomen contained about eleven ounces ascitic fluid, clear amber; body œdematous, small hemorrhages everywhere in the skin and in the tissues; blue veins over the abdomen. Development good. Liver large. Right lobe contained small lime concretions found by the microscope to lie in the veins. Kidneys: small lobulated hemorrhages. Spleen large. Lungs: partial aëration. Body, lb. iv 5j 5j; liver, 5ij 3vss; heart, 5iijss; spleen, 3vss; thymus, grs. xxiv.

In this thymus, as in Case VII., the amount of connective tissue far exceeds the area occupied by the tissue in the follicles or acini. Not only is the connective tissue (fibrillar with spindle-shaped and round cells) marked in the spaces between the acini, but it is seen to encroach markedly on the tissue of the follicle, and in places replace it to a large extent. The blood vessels of the con-

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nective-tissue septa or the acini, present no changes other than seen in Case VII.

The parenchyma of the follicle presents nothing pathological but the presence of connective tissue forming, or in an advanced state, giving the appearance as if the follicles were traversed by bands of a tissue composed of a finely fibrillated basement-substance, containing a large number of spindle-shaped and spheroidal cells.

CASE IX. *Congenital syphilis; opisthotonos*.—Irene C., age six months.

March 6. Always in poor condition, but has been failing since yesterday; constipated when admitted six weeks ago; not constipated now; yesterday, slight cough, rapid pulse. Physical examination: Slight dullness on the left side behind lower lobe; bronchitis on both sides, not marked. Yesterday and to-day slight vomiting, restless, erythema over the chest and face. P. M., temperature 103° . No enlarged glands.

7th. Rested well, nursed well.

9th. Opisthotonos; marked at times. Temperature last night, 104.6° . This A. M., 103.2° . Cracks and fissures about the mouth (eczema?). Very restless; bowels irregular, stools white and constipated; vomiting. Nurses. P. M., marked opisthotonos. 10.15 P. M., opisthotonos extreme and continuous, thighs and legs flexed strongly; no loss of sensation apparent. Neck very stiff.

16th. Enlargement of glands in left submaxillary region. Temperature slightly elevated.

18th. Pale red eruption over face and the whole body, especially the legs, soon fading from body and extremities. Opisthotonos continues in spite of opium.

21st. Opisthotonos has gradually increased, head very much extended, eruption faded somewhat, but returned again, and again faded almost entirely. Glands in the left submaxillary region have increased greatly in size. Temperature remains slightly elevated, no abscess found.

23d. Died 11.30 P. M.

Autopsy. *24th*, 1 P. M.—Body emaciated; no rigor mortis. Lungs: Broncho-pneumonia left side, lower lobe. Liver congested. Bronchial glands enlarged, not cheesy; mesenteric glands enlarged; inguinal glands enlarged;

cervical glands enlarged, especially on the left side. Kidneys congested, markings distinct, slightly enlarged, firm.

Urine P. M., no casts. Tabes cranii, beaded ribs, fontanelle very open, internal ear on each side normal. Bone behind the external ear on the left side over a small area (one-quarter inch) bare. No abscess cavity.

Brain normal, spinal cord normal; long bones, articulations congested, but condition not absolutely diagnostic of syphilis, though suspicious. Body, lb. vj 5xv; heart, 5vss; liver, 5v 3j; spleen, 5vj; thymus, grs. xlj.

The amount of connective tissue in this thymus, as compared to that generally seen in the organ normally, is quite marked, and the follicles give the gross appearance under a low power as if blending or fusing into one another. They have a closely packed, flattened appearance. The acini are traversed by transparent bands of connective tissue; this connective tissue is of a fibrillated character, and contains spindle-shaped and round cells. The basement-substance has a transparent, finely fibrillated appearance. There are areas in which the above connective tissue has almost entirely replaced the parenchyma of the follicle.

The blood vessels show the changes seen in organs which are the seat of interstitial connective-tissue increase. The walls are all uniformly thickened (see remarks). The adventitia is, in many vessels of small size, surrounded by a zone of connective tissue containing spindle-shaped and round cells, arranged concentrically (this is seen in thymuses taken from subjects dying from other causes than syphilis). The above changes in places are more marked in the cortical zone of an acinus.

CASE X. *Congenital syphilis* (?); *diarrhœa*.—Medora C., aged seven months and five days, returned from wet-nurse February 3, 1888; emaciated; afterward bottle-fed. Cervical and inguinal glands enlarged. Liver and spleen appear normal in size. Continued to fail slowly; *diarrhœa* occasionally.

April 17, 6 A. M., died.

Autopsy. 17th, 2 P. M.—Body emaciated; lungs normal; spleen normal; liver slightly large, congested; heart nor-

ANATOMY AND PATHOLOGY OF THE THYMUS

mal. Kidneys appeared normal, except that they were much congested. Peyer's patches slightly swollen and congested. Cervical and inguinal glands enlarged; mesenteric glands enlarged; bronchial glands not enlarged. Body, $6\frac{3}{4}$ pounds; heart, 5vss; spleen, 5iv; liver, 5v 5ivss; thymus, grs. xxivss.

REMARKS.—The appearances, both as to weight and size of the thymus, being so variable at different ages, it was attempted to discover whether the thymuses taken from infants at the same, or about the same ages as those taken from syphilitic subjects presented the same, or nearly the same, appearances under the microscope. In many cases so examined the ages not only equalled those of the syphilitic children, but were some of them either younger or older (one, five and a half years). In no case, whether the thymus was taken from a newborn infant, or one dying with tuberculosis or diphtheria, could exactly the same appearances be duplicated.

Reference is now more particularly had to the immense quantity of connective tissue in the thymuses taken from syphilitic infants whether the thymus be small or large. In one case in which the history simply suspects syphilis, the changes already described were duplicated, but to a very marked degree. In one of the cases the thymus was taken from a premature child (a miscarriage of seven months). The thymus was very small and weighed twenty-four grains, but showed the most marked amount of connective tissue, as seen by the description.

The blood vessels in all the cases examined did not show changes limited to any particular coat of the vessel, but a general thickening of all the coats. In some places, both in the interstitial septa and follicles, the vessel was found simply replaced by a ball of connective tissue. But between these two forms no intermediate forms were seen. That is, no vessel was found in which the intima was the seat of thickening, as seen in the cerebral or other arteries which are the seat of endarteritis obliterans. The changes seen resemble those found in chronic interstitial inflammations of the liver or kidneys.

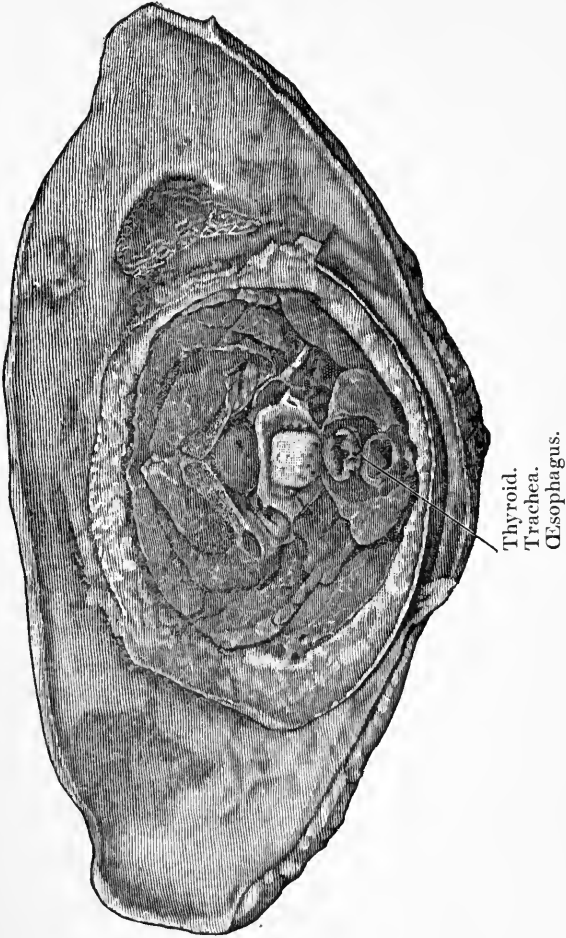
FROZEN SECTIONS OF THE NEWBORN INFANT

PLATE I.

IN this section the cut passes just beneath the cricoid cartilage in front, and behind the *fourth cervical* vertebra is seen.

The plate being photographed from the interior cut—that is, the section which lay beneath the knife, the body being upright—we must imagine ourselves looking down upon the cut body. If we turn the vertebra toward us, the right of the subject corresponds to the right of the plate. In front is seen the trachea cut just below the cricoid cartilage surrounded by the lobes of the thyroid gland on each side. The thyroid stretches here in front and behind, encroaching also on the œsophagus, which is directly behind the trachea. The œsophagus juts directly on the vertebra, which is seen to be cut at the intervertebral cartilage, exposing its body. Outside of all these parts is seen the skin, which just covers the shoulders of the infant. The relation of the larger vessels is best seen in the actual specimen.

PLATE I.



Thyroid.
Trachea.
Æsophagus.

PLATE II.

Imagining the body upright, this section lays *above* the knife. It was, therefore, facing downward; the parts being turned upward and photographed, we must consider ourselves looking at the section from below upward. Holding the section in the same position as in Plate I., the right of the subject is to our left, and the left of the plate.

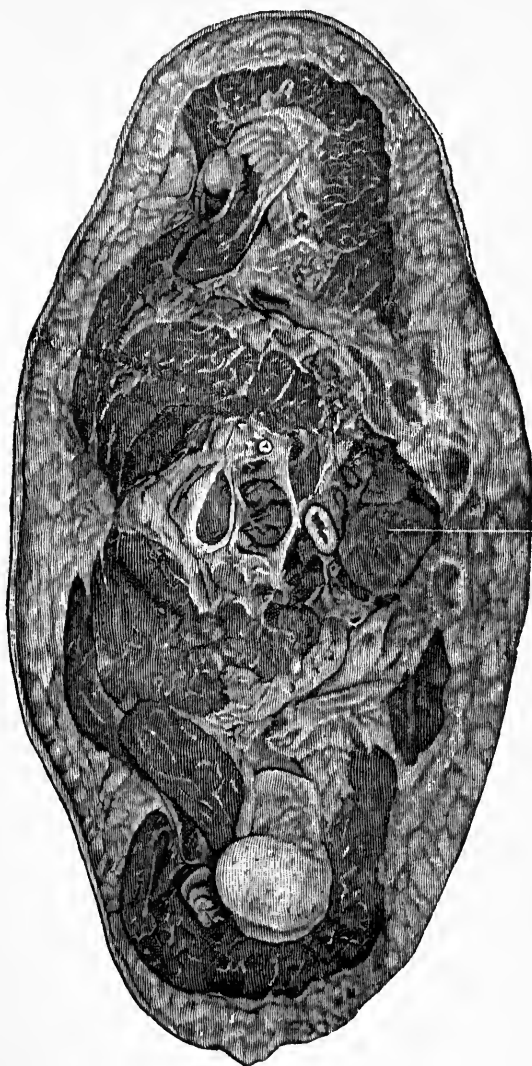
The tops of the heads of the humeri are seen here just grazed by the knife. In front are seen the insertions of the sterno-cleido-mastoid just above the sternal notch.

Behind these two landmarks is seen the *thymus*, with its two lobes, and the large vessels of the neck on each side.

Behind the notch, between the two lobes of the thymus, is seen the trachea, its anterior curved portion of cartilage, the posterior soft collapsed portion. Posterior and to the left is seen the œsophagus. Posterior to the œsophagus is the cut body of the sixth cervical vertebra.

ANATOMY AND PATHOLOGY OF THE THYMUS

PLATE II.



Thymus.

PLATE III.

This section is made and situated as to the knife exactly as that of Plate II.

In front is seen the junction of the first rib with the sternum.

Behind the cut passes through the body of the first dorsal vertebra. Just behind the first piece of the sternum is seen the thymus (the darker portion) of an irregularly oval form.

To the right and behind the thymus is seen the collapsed innominate artery.

Behind the centre of the thymus is seen the trachea, behind and to the left of the trachea the œsophagus.

The apices of the lungs are seen on each side. Outside of the above district the heads of the humeri are seen, and behind obliquely stretching backward the scapulæ.

It is to be noted how the thymus occupies in this infant the greater portion of the superior opening of the thorax in the recent state.

ANATOMY AND PATHOLOGY OF THE THYMUS

PLATE III.



Thymus.

PLATE IV.

Behind is seen the body of the third dorsal vertebra. In front is seen the sternum at the level of the second rib.

The interior surface of the section is shown in the plate, so that the parts are looked at from below.

The plate being held with the vertebra toward us, the right of the plate corresponds to the left of the child.

In front the large oval mass of the thymus is seen situated in the anterior mediastinum.

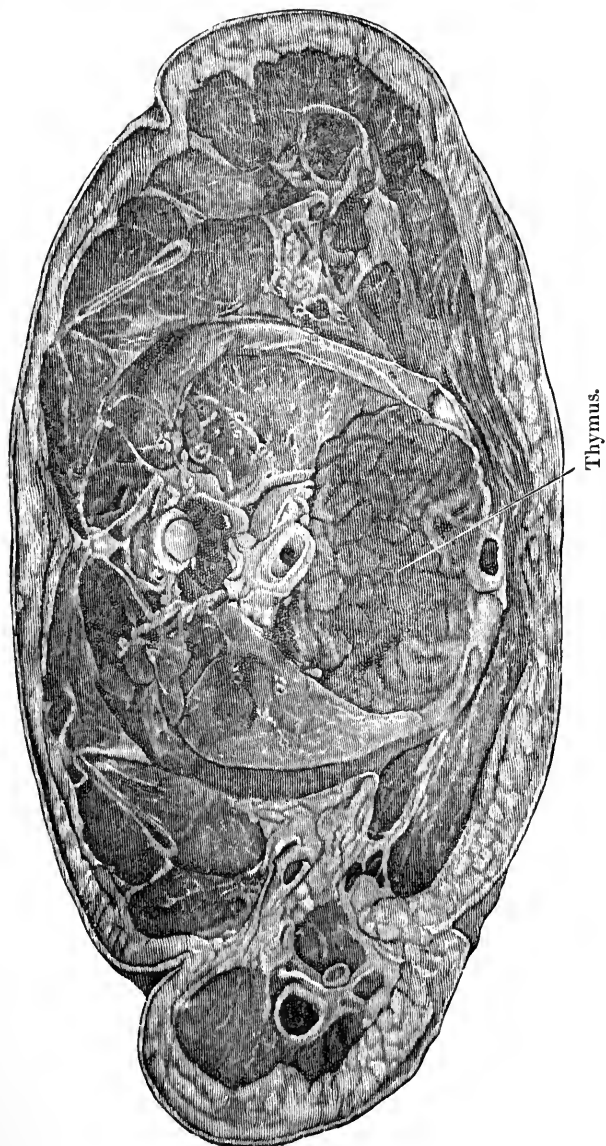
Posterior to this is the superior part of the aorta cut just below the points of origin of the innominate and carotid.

The œsophagus is situated to the right and behind the aorta.

The large extent of space occupied by the thymus is caused by its oblique position to the transverse direction of the cut.

ANATOMY AND PATHOLOGY OF THE THYMUS

PLATE IV.



DR. JACOBI'S WORKS

PLATE V.

Looking at the section from below upward. In front is seen the middle piece of the sternum. Behind, the body of the fourth dorsal vertebra. The ribs stretching between are indicated by the insertion of the intercostal muscles.

The section is cut on one side just beneath the axillary fold, on the other side it grazes this fold. The heart here forms a very good starting-point. The mass of the right ventricle is seen. The right and left auricles on each side above. The roots of the two lungs on each side behind the auricles. The unaërated lungs on each side. The œsophagus behind and to the right lying on the body of the vertebra. The inferior surface of the body of the vertebra is seen. The *thymus* is here shown as a pear-shaped body, the point of the pear stretching back. It is situated here between the heart and the anterior border of the right lung. In the specimen itself it lies on the anterior surface of the anterior layer of the pericardium. The peculiar shape here shown is caused by the oblique position of the heart and the thicker anterior border of the thymus.

PLATE V.

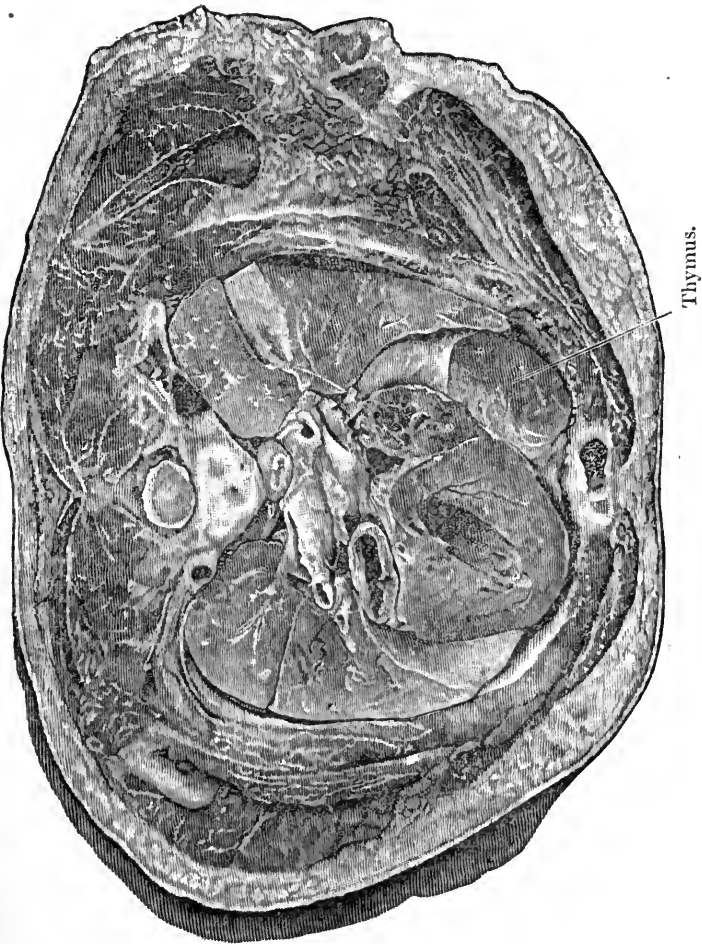


PLATE VI.

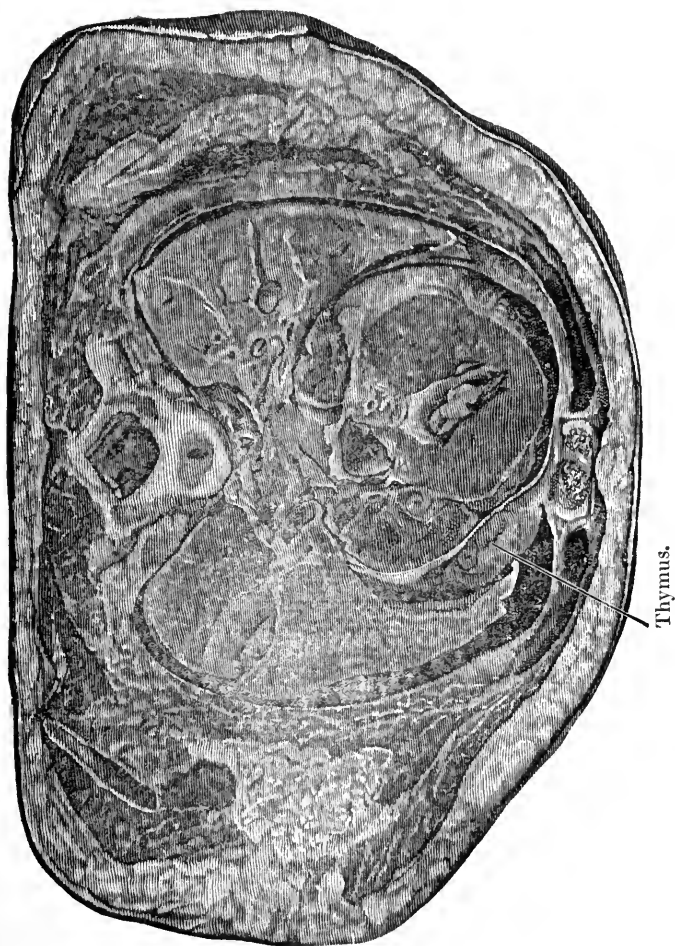
This section is the companion cut to the one of Plate V., fitting just below it. It was below the knife, while that of Plate V. was above the knife; we are here looking *down* on the section. Holding the plate, as in Plate I., the right of the plate corresponds to the right of the infant. Behind we see the body of the fifth dorsal vertebra. In front, the sternum.

The heart is seen surrounded by the pericardium, which is indicated by a rough line surrounding the heart. The right and left auricles are seen, as also the mass of the left ventricle, the walls of which are exposed to the left of the plate (holding the plate with the vertebra toward you). To the right are seen the walls of the right ventricle and part of the cavity of the same.

The *thymus* is seen to the right of the pericardium as a small, ragged oval piece of tissue, partly overlapped by the anterior border of the right lung. The unaërated lung with its fissures and roots is shown. The specimen having been prepared in strong alcohol, the shrinkage shows an exaggerated pleural space.

ANATOMY AND PATHOLOGY OF THE THYMUS

PLATE VI.



Thymus.

PLATE VII.

This section was taken from a child whose age, as near as could be calculated (post-mortem), was about two months. The cause of death was broncho-pneumonia.

To understand this plate, we must imagine ourselves looking at the section from below upward with the vertebra of the subject toward us. The right of the plate corresponds to the left of the child.

In front is the top of the second piece of the sternum.

Behind is the inferior portion of the body of the *third* dorsal vertebra. The lungs are cut just above their roots.

The arch of the aorta occupies the centre of the plate.

Behind the aorta are seen the œsophagus and the right bronchus. *In front* of the aorta, occupying the anterior mediastinum and surrounded on the outside by a reflection of the pleura, is seen a triangular structure, the *thymus*.

This plate and accompanying mounted section show well the position of the thymus in the mediastinal space.

The mounted hand specimen belonging to the above plate shows a view of the superior surface of this section. Here the position of the thymus to the arch of the aorta and the points of origin of the great vessels of the neck, and the very close relation to the trachea, are well shown.



Thymus.

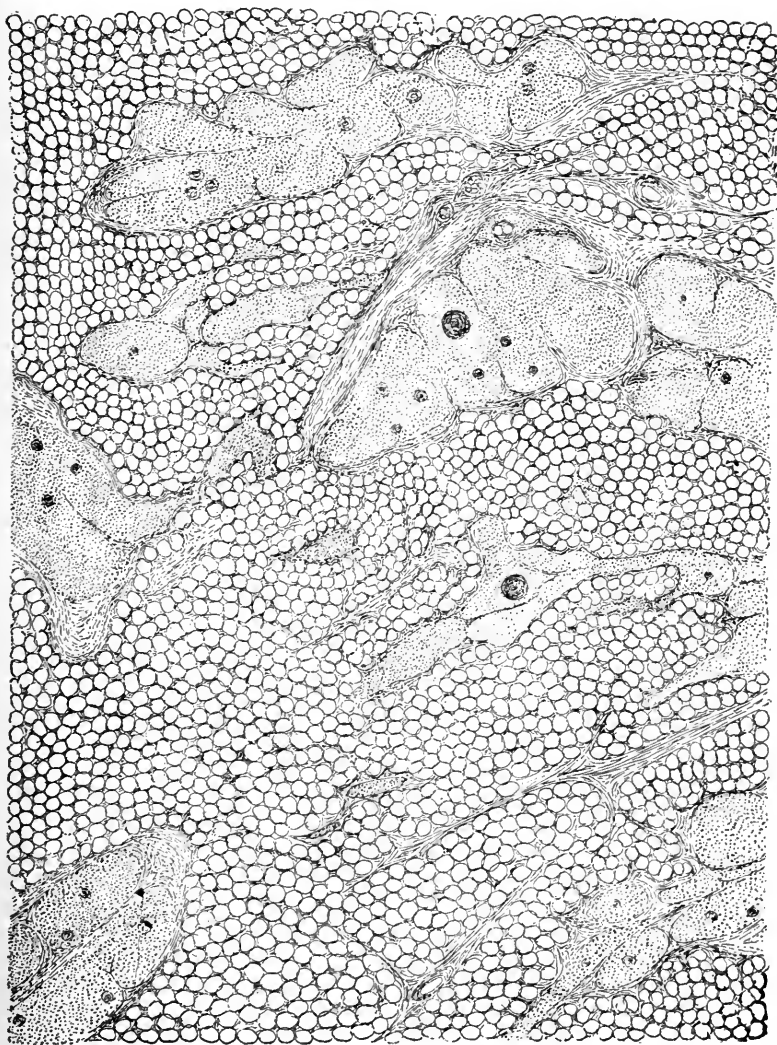
DR. JACOBI'S WORKS

PLATE VIII.

Adult persistent thymus. (See p. 257.)

ANATOMY AND PATHOLOGY OF THE THYMUS

PLATE VIII.



TUBERCULOSIS OF THE THYMUS

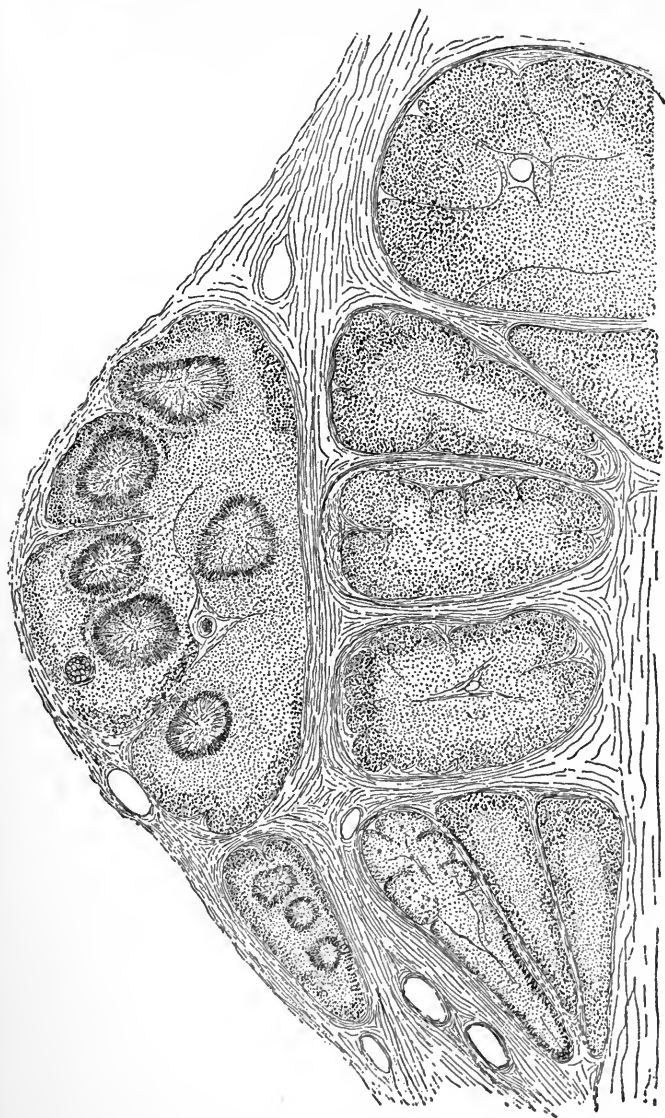
ALL the plates are drawn accurately from the actual specimens by means of the Abbé camera lucida.

PLATE IX.

is a section of a portion of the thymus of Case I. The drawing is simply topographical, and is intended to show the manner of eruption of the miliary tubercles in the acini of the thymus. The miliary tubercles are represented in the upper part of the picture as irregularly round bodies with lighter centres (cheesy) in the midst of the thymus tissue. The normal acini are represented with a darker external zone (cortical), and a lighter central zone (medullary portion).

ANATOMY AND PATHOLOGY OF THE THYMUS

PLATE IX.



DR. JACOBI'S WORKS

PLATE X. (× 185 diameters)

is also taken from Case I. It is intended to show more closely the structure of the miliary tubercle, its periphery and cheesy centre. The tissue between is represented by closely packed round cells, rich in blood-vessels, which are naturally injected with blood. The reticulated structure of the periphery of the basement-substance of these miliary substances is shown here as small spaces, from which the round and polygonal cells have been shaken by manipulation.

ANATOMY AND PATHOLOGY OF THE THYMUS

PLATE X.

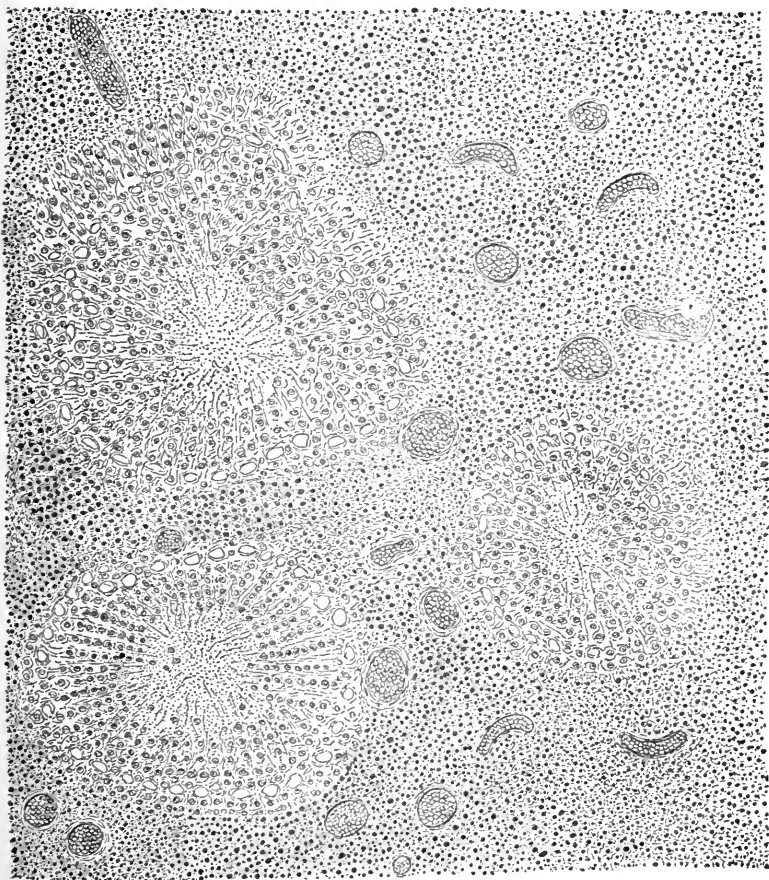
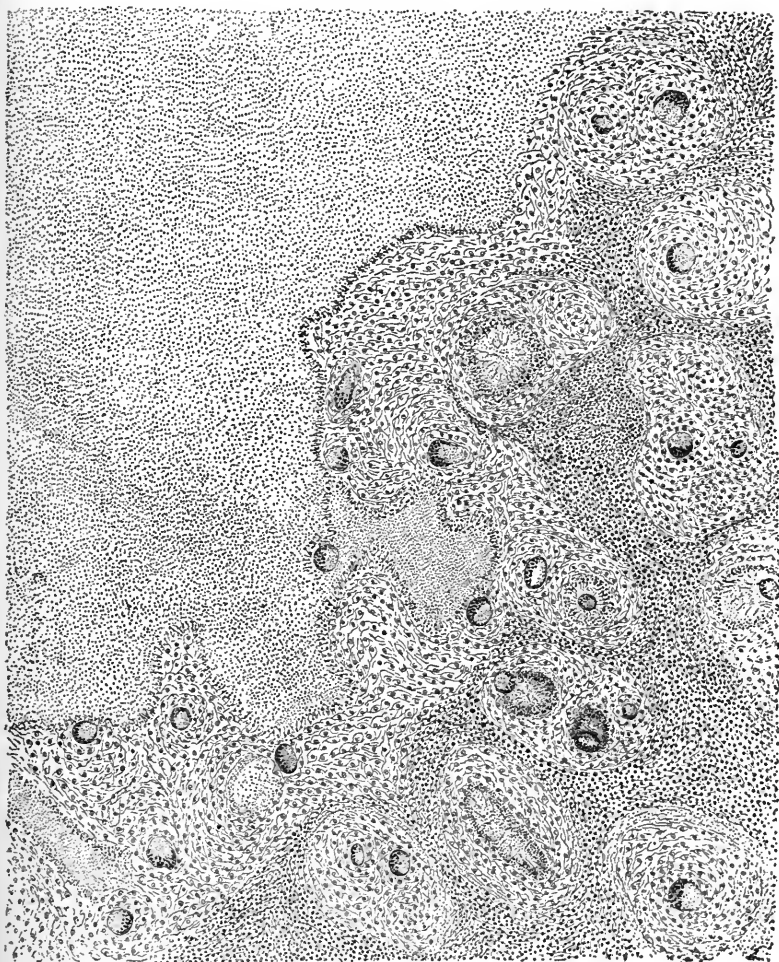


PLATE XI. ($\times 85$ diameters)

is the periphery and central portion of coagulation-necrosis of a cheesy nodule of the thymus; here the tubercle granula, unlike the *previous specimen plate*, show giant cells. Some of the granula have cheesy centres; the spaces between the granula are filled with small round cells.

ANATOMY AND PATHOLOGY OF THE THYMUS

PLATE XI.



DR. JACOBI'S WORKS

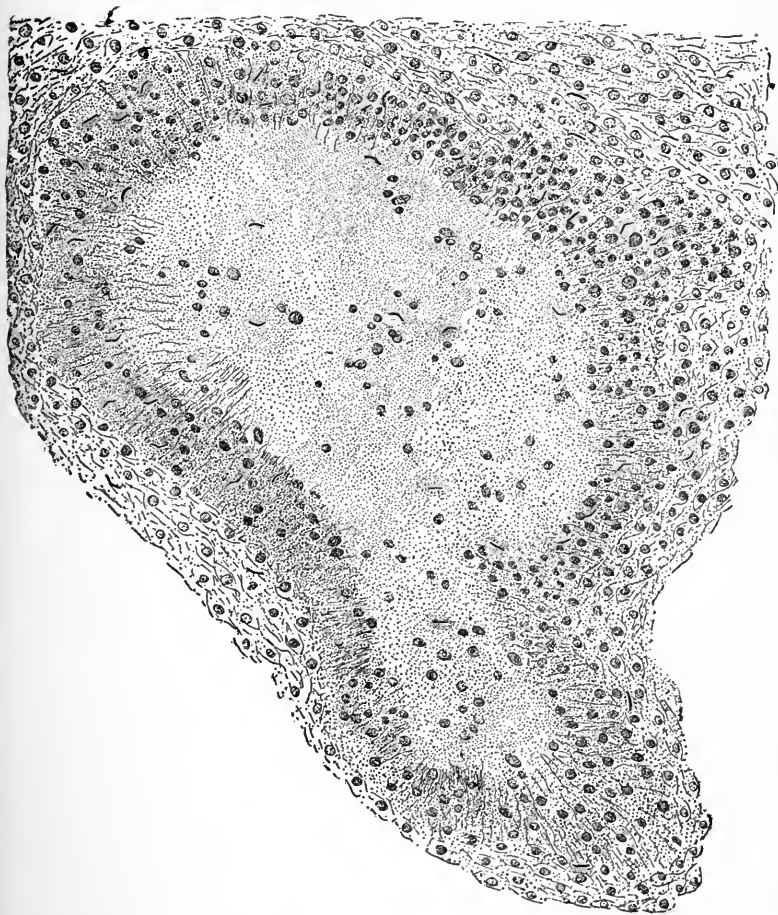
PLATE XII. ($\times 550$ diameters. *Tubercle bacilli.*)

shows under a high power the appearance of a miliary tubercle of Case I.

The specimen prepared by Koch-Ehrlich method to show tubercle bacilli. The miliary tubercle (decolorized) was first drawn with the camera lucida, the tubercle bacilli were counted with an immersion $\frac{1}{12}$, and then as near as possible drawn into the sketch. The tubercle bacilli are, therefore, a little exaggerated as to their actual size and thickness for the sake of illustration. They are seen in *moderate numbers only*, and are found in the cheesy centre, in the periphery of the miliary tubercle and in the tissue between the miliary tubercles.

ANATOMY AND PATHOLOGY OF THE THYMUS

PLATE XII.



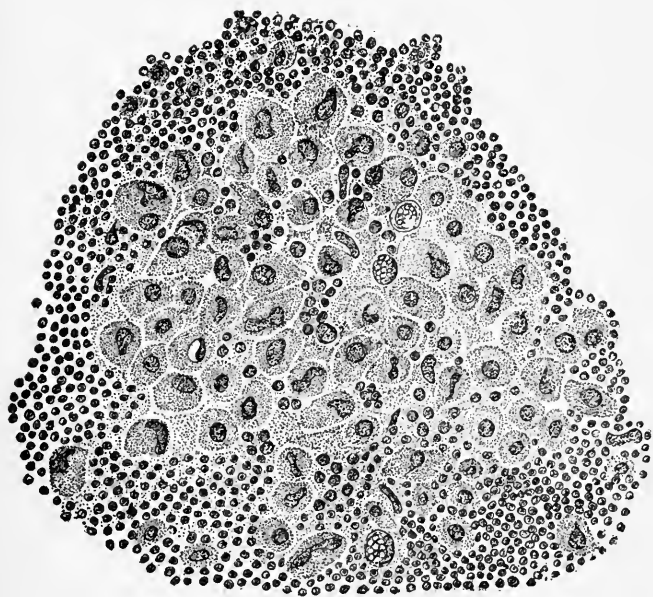
DR. JACOBI'S WORKS

THYMUS IN DIPHTHERIA

PLATE XIII.

THYMUS from a severe case of diphtheria.

PLATE XIII.



SYPHILIS OF THE THYMUS

PLATE XIV.

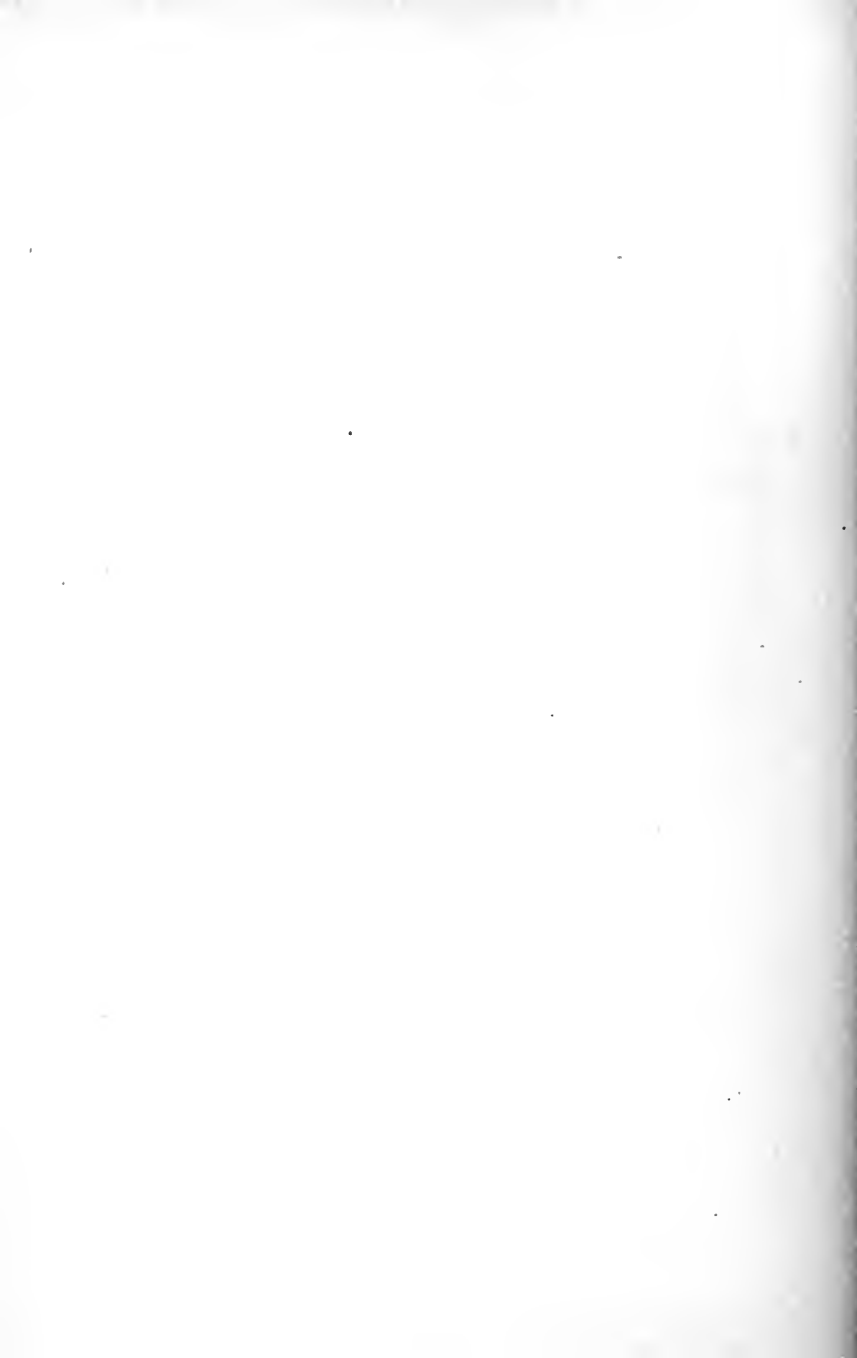
Gumma (?) in the thymus.

a. Cheesy centre; *b.* Small round cells; *c.* Thymus tissue; *d.* Blood-vessel; *e.* Connective tissue zone; *f.* round-cell infiltration.

ANATOMY AND PATHOLOGY OF THE THYMUS

PLATE XIV.





DR. JOHN COOPER'S CASE OF ISCHIOPAGUS

THE publication of this new case of ischiopagus is mainly undertaken on account of a remark contained on page 85 of Fr. Ahlfeld's classical work on malformations which is as follows: "Though ischiopagi might continue to live, no specimen of this monstrosity has been known to live more than a year."

My attention was first drawn to this case by Dr. E. L. Larkins of Terre Haute, Ind. It belonged to Dr. John Cooper of Groomesville, Ind. To the latter gentleman I am under particular obligation for responding to my inquiries and for the permission to use his notes. He writes:

"The babies you have referred to were born to Mr. and Mrs. Jones, of Tipton Co., Ind., on the night of June 24th, 1889, at 11:30 o'clock. Their weight at birth was twelve pounds, and length twenty-two inches.

"The labor was quick and easy. Their bodies, as they lie upon their backs, are in the same plane, form a straight line and are literally placed end to end, the place of union being the pelvis. There are four well-developed feet and legs; two on each side of the line of fusion, and placed at right angles with the bodies. Both are females. The genital organs and ani are situated on the side of the line of union, but occupy the normal position with reference to the legs on either side. The genital organs and anus of each child are on its right side between its right leg and the left leg of the other. There was one umbilical cord. Their osseous union was at the tuberosity of the ossa ischii. There is no nervous connection, hence one may sleep and the other be awake, and one may have very high fever and the other be in the best of health. I have seen one have a severe attack of bronchitis and the other remain quite well. There is no connection of the circulatory system except of the capillary vessels at the point

of union. In fact, they are two distinct and separate bodies as far as dependence on each other is concerned. The mother is a well-developed woman of nineteen years, of medium size and very dark hair. The father is a finely formed man, five feet nine inches in height and with sandy complexion. The babies are the result of a second gestation, the first being a well-formed child of two years. I had these babies on exhibition at several county fairs and at the following places: Chicago, Minneapolis, St. Paul, Pittsburg, and Philadelphia. Dr. T. O. Armfield then took charge of them and went to Buffalo, where they took measles, followed by capillary bronchitis, from which they died."

A letter replying to several questions of mine was lately received from Dr. Cooper with the following remarks: "They were *eight months* old when they died. They took measles at the same time and lived nine or ten days afterwards. One died forty minutes before the other.

"Both children developed equally. The faces displayed the same intellect. They cried (shedding tears) and smiled as early as normal infants. They had perfect use of their lower extremities. Adduction and abduction were normal."

Ischiopagus is not so rare as pygopagus, which presents the highest degree of fissure in cases of anterior duplicity with only the caudal extremities connecting. Plate xii. of Ahlfeld's atlas exhibits a number of transitions from a simple dicephalous tetrabeachius to ischiopagus. The former shows a duplicity of heads and upper extremities only. A simple third leg is the next step in the series of duplications; it is followed by a third leg with two feet. Finally the fourth leg makes its appearance and the ischiopagus tetrapus is complete. It exhibits a big pelvic cavity, the sacra are opposite, the abdominal integuments in common. The lower extremities are well developed, but inserted rather exteriorly from the normal point. The genital organs are united mutually, like the bones of the pelvis. If one side be but poorly developed, the genitals are not so complete. If there be but one lower extremity to one of the infants, there is but one set of genitals. The

DR. JOHN COOPER'S CASE OF ISCHIOPAGUS



DR. COOPER'S CASE OF ISCHIOPAGUS.

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thoracic viscera, liver, spleen, pancreas, stomach, group of intestines, and two sets of kidneys are double. Vagina, rectum and bladder are often confluent. Sometimes there is atresia of the anus, and of the urethra, and a cloaca is persistent.

Placenta and cord are single. There is on record, however, an isolated case by Calvin Ellis, with two placentas and two cords (*Boston Medical and Surgical Journal*, Oct. 7, 1871). Externally there was but one anus, and one set of genitals. There were but three lower extremities. Of these one was but rudimentary, but contained two ossa femoris, two tibiæ and two fibulæ. Its foot had two tali, and two large and six smaller toes. After the stronger child had successfully passed through an attack of gastro-enteritis, the smaller one was taken and died after an illness of four days. Six hours before her death the other appeared to be sick, and died three hours after the death of her sister. Age is not mentioned in the report.

SEPTIC PERFORATION OF THE RIGHT INTERNAL CAROTID ARTERY

THE clinical history of the case, which was learned five months after death, began two weeks before death with ordinary symptoms of croupous tonsillitis; there were membranes on both tonsils. The report of the New York Health Department gave on Klebs-Löffler bacilli. After one week the throat was pronounced clear and the child was much better. Monday, May 2d, about one week after the beginning of the illness, the patient had a severe chill, with rise of temperature, pain in the throat, and dysphagia. The lymph-nodes on both sides of the neck soon became much swollen. The temperature rose considerably and the patient was much prostrated. On May 4th there was a considerable hemorrhage from the nares and pharynx. On May 6th a second very profuse hemorrhage occurred, "filling a bowl" with apparently arterial blood. Its color was described as being bright. On May 8th there was a third severe hemorrhage. The nares were then plugged. On May 10th, early in the afternoon, the plugging was removed from the nares while the child was struggling much, and a fourth severe and fatal hemorrhage occurred, blood coming from the nose and mouth. The exact point of issue of the previous hemorrhages was not ascertained.

The autopsy was held 5 months and 8 days after death, on October 18th. The body had been interred in dry gravel, in a wooden casket, surrounded by a casing-box of pine. The outer box was quite dry. The casket was moist, with no molds seen inside or out. Running from the foot of the casket was a blood-stained line which had slightly soiled the covering of the coffin and the bottom of the box. The internal coverings were moist, the clothing of the cadaver much decayed in places, especially over and

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under the trunk. Covering the clothing and the skin of the entire body was a layer of coarse, brownish dust, in which were many small white insects, the size of a pin-head, and their small oval eggs. This dust, composed of the insects and excreta, had produced a dark-brown discoloration of the skin, especially of the face, which was nearly black in places. The body was rigid, the skin much desiccated and over the fingers almost horny. The nails and hair were firm, the teeth very loose. The orbits contained a little black, grumous fluid; the lids and lashes were intact. The cheeks, chin, nose, and features were apparently natural and not shrunken.

The tissues of the neck were more moist than elsewhere. Over the right parotid, the sternomastoid, and in the posterior temporal region there was marked oedema of all the tissues. The lymph-nodes of both sides of the neck were much swollen, down to the clavicles. The tissues of the posterior pharyngeal wall were very dark, but not necrotic, especially on the right side. A large cavity, filled with black fluid in one compartment and bright blood in the deeper portions, was found bounded internally by the right tonsil and pharyngeal wall, which here was very thin. It reached about 2 cm. below the tonsil, above nearly or quite to the bony vault of the pharynx, and it extended posteriorly to the deep tissues of the neck and involved the internal carotid and its branches in their irregular ramifications. This cavity consisted of one older, smooth-walled portion lying nearest the tonsil and just behind the thinned pharyngeal wall, and measured about 2 cm. in diameter. The rest of the cavity appeared to be of more recent formation, and was filled with fresh blood, partly clotted. The internal carotid, 1.5 cm. above its origin, showed an irregular opening, 5 mm. in circumference, freely communicating with the deeper portion of the above cavity. On the posterior wall of the pharynx, at the level of the tip of the epiglottis, was a ragged opening of similar dimensions, leading into the older and superficial portion of the cavity. The tonsils showed numerous deep excavations, but no ulcerations. The mucous membrane of the nares was in an advanced state of de-

SEPTIC PERFORATION OF CAROTID ARTERY

composition, the periosteum was loose, the vomer free from its articulations. There were no evidences of hemorrhage in this region. The larynx appeared quite normal, but was filled with reddish-brown fluid. The trachea was normal.

The lungs were very firm, the pleura desiccated and shiny. There were 4 oz. of yellowish, transparent fluid in the pleural cavities. The lungs showed numerous lobules sharply marked off, dark reddish, filled with blood. In the right lower lobe one area was softened, gelatinous, decolorized, resembling clots found in some veins. The lungs otherwise were very anæmic.

The heart was very hard and tightly contracted. The right side contained a firm dark clot of moderate size. The left was entirely empty. The muscle, though anæmic, was normal. Its valves were normal.

The liver was much desiccated superficially and very firm, very light leaden in color. The markings were indistinguishable. Section showed numerous small cavities, some of which are patent blood vessels. The gall bladder was contracted and empty. The spleen was moderately enlarged, the capsule smooth, hard and dry; it was dark gray on section. The Malpighian bodies were light gray and very distinct.

The kidneys were normal in size, very firm in consistence, and dry. On section, they were very light-colored and anæmic. The pyramids were moderately congested, the markings distinct and regular. The adrenals were slightly desiccated. The pancreas was very firm, dry, and appeared normal. The œsophagus was contracted and very hard.

The stomach was tightly contracted, firm, its mucous membrane well preserved, and thrown into prominent rugæ. It contained a little semi-fluid matter, of the color of coffee-grounds. The peritoneum was shiny, very dry, and light-colored, like paper. An abnormal band constricted the ascending colon about its middle, and the cecum appeared considerably dilated.

The colon contained considerable brownish desiccated fecal matter. The muscular system was very dry, tough, and of a bright-red color. The aorta and large arteries

were very tough, dry, and shrunken. The large veins were firm, and contained a little clotted blood; in some places they were decolorized and gelatinous.

On microscopical examination, the wall of the pharyngeal (abscess) cavity was found to be composed of intensely inflamed granulation-tissue in the older portion, and of connective and muscular tissue infiltrated with serum; blood and leukocytes were found in the deeper portion. A section of the wall of the carotid, just above the point of rupture, showed this vessel running through an area of advanced purulent inflammation. At this point, the adventitia was œdematous, the muscular coat split up, and at one point very thin. The intima appeared intact. In the same section the wall of the internal jugular vein was so infiltrated with leukocytes and serum that its structure was almost indistinguishable.

The cervical lymph-nodes showed an intense exudative inflammation, but no collections of pus were seen. They showed considerable post-mortem necrosis. The consolidated lobules of the lungs were filled with a homogeneous reddish substance, without signs of inflammation, either in the parenchyma or bronchi.

The cells of the liver were partly necrotic; the cell-bodies stained faintly, were extensively vacuolated and coarsely granular; the cell-membranes were very distinct and the nuclei faint. Many capillaries were stuffed with leukocytes, which sometimes appeared in collections of 50 to 100, both mononuclear and polynuclear.

The cells of the kidneys showed usually partial granular fragmentation, but many appeared entirely intact and normal. There were no evidences of an inflammatory process.

In the spleen there was considerable increase of mononuclear and polynuclear cells, both in the pulp and in the Malpighian bodies. All the structures were well preserved.

The stomach-wall was normal, with very little superficial post-mortem necrosis of the epithelial lining.

Sections through the wall of the cavity, stained by methylene-blue, showed numerous colonies of cocci. No bacilli or chain-cocci could be distinguished.

SEPTIC PERFORATION OF CAROTID ARTERY

The anatomical diagnosis was peritonsillar and retro-pharyngeal abscess; inflammation and rupture of the right internal carotid artery; healed croupous inflammation of the tonsils; purulent inflammation of the large branch of the internal jugular vein.

EPICRISIS.—The history and pathologic examination indicate positively the development of a peritonsillar and retro-pharyngeal abscess following a croupous tonsillitis. As no Klebs-Loëffer bacilli were found in the bacteriologic examination of the Health Board, the croupous inflammation was of staphylococcal origin, in accordance with the above results of the bacteriological examination. The first hemorrhages must have resulted from rupture, following inflammation of veins or arteries attacked by the advancing suppuration. The fatal hemorrhage undoubtedly came through the openings demonstrated in the internal carotid artery and pharyngeal wall, a necessarily fatal lesion. The condition of the internal jugular vein indicates that it or its branches were possibly the point of origin of the first hemorrhage. The second hemorrhage, which is reported to have been very copious and of bright color, must have been arterial.

Is it possible to make a correct diagnosis of the source of such a hemorrhage? Many a case may be decided by the character of the blood, whether arterial or venous; but in many septic conditions the color of the arterial blood is no longer bright, and from a large septic cavity the discharge may be both arterial and venous. In exceptional cases (as was remarked by Guthrie 50 years ago, and by Liddell, Roux, Wahl, and others) a large lacerated artery with a ragged interior or irregular edges may, while bleeding, exhibit a murmur. In other cases, when the question is between a hemorrhage from the carotid and the nasopharynx, the digital compression of the artery is, in an urgent case, provided a medical man is present, more likely to answer the inquiry as to the source of the bleeding.

During the progress of an inflammatory and suppurative process round cells are caused to proliferate near the vasa vasorum of the media, and the endothelia of the intima

multiply rapidly. In this way the resistance of the vascular tube is increased, and many a threatened calamity may thus be avoided. When, however, a rupture of the blood-vessel wall has taken place, the hemorrhage depends on the size of the laceration, and also on the condition of the patient. For every hemorrhage creates a disposition to its cessation by lowering of the blood pressure; there may even be syncope, and a clot may form. But within a single day, or several days, the amount of circulating blood is increased, the heart becomes more vigorous, and the clot is expelled. In cases of ulcerous erosion, when the patient has suffered from a septic process, circumstances are least favorable. In them there are rarely long intervals between the hemorrhages. Fatal cases of that nature are not very common. A certain number have been observed in syphilis, sometimes in the course of an arteritis, mainly in the young, in which the skin, the brain, or the periosteum is frequently subject to bleeding from that cause. Metrorrhagia has been observed under the same circumstances (Bradley). Gummata located in the blood-vessel walls, or more often in their neighborhood, will ulcerate and lacerate. Thus Bernhard (*Lancet*, 1872) had to ligate the common carotid because of formidable hemorrhages originating in the larynx. Morell Mackenzie¹ cites the case of a hemorrhage probably from a vertebral artery, as the patient expectorated the transverse process of his epistropheus. Landrieux² describes the case of a patient who had gummas in very many organs, besides periostitis. His pharynx was full of ulcerations and cicatrices; one of the ulcerations communicated with the internal carotid. He died of the second hemorrhage, which took place two days after the first.

Parenchymatous or venous bleeding, more or less copious, sometimes fatal—as in a case of Rosenthal's—in scarlatina, diphtheria, and hemophilia, or in septic processes complicated with leukocythemia or scurvy, have been seen frequently. Trifling extravasations from dilated blood vessels behind the uvula or in the nasopharynx, which now

¹ "Diseases of the Throat and Nose."

² Bull. Soc. Anat., Paris, July, 1874.

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and then are mistaken for hemoptysis, I do not here count. In a single case I saw also a fatal series of hemorrhages in an old man who had inaccessible sclerotic veins in his posterior nares.

What concerns us here is a fatal hemorrhage from erosion of an artery, complicated with phlebothrombosis. The lesion of the artery was evidently the result of local suppuration. Eighty-eight such cases of hemorrhage from large arteries caused by suppuration were collected by Monod. In 37 they were occasioned by abscesses in the soft parts, viz., tonsils, retro-pharynx, lymph-bodies of the neck, and secondary processes in typhoid fever and in scarlatina. In many cases the internal carotid, in two the aorta were injured. Monod has also two cases of inguinal buboes with erosion of the femoral artery; Koenig, who in 1889 quoted Monod, suggested that many of these hemorrhages were caused by "pus bonum et laudabile"; in 1898 he would not make this distinction, at least not with the same assurance. For there is undoubtedly a destructive effect as well of an uncomplicated staphylococous process as of a mixed infection.

Fatal cases of erosion of large blood vessels in the throats of septic children are, however, not very frequent. I knew of no case when I published my "Treatise on Diphtheria" in 1880. V. Gautier, it is true, had two fatal cases of pharyngeal hemorrhage—one quoted from Rendu, who found the carotid and its branches intact—and one of his own, in which vertebral caries was found, but the source of the hemorrhage was not discovered.³ Greenhow⁴ quotes Williams, who had a fatal case, in which the patient died apparently from the profuse discharge of bloody material resembling claret from the throat, amounting to two pints a day, but here, too, the local lesion was not found. Still, Becquerel had previously published⁵ a case of death resulting from an ulcerous lesion of the inferior pharyngeal artery. Quoting this case, Green-

³ Des abscesses retro-phar. ou de l'angine phlegmoneuse. Bale, 1869.

⁴ Diphtheria, 1860, p. 209.

⁵ *Gaz. Méd. de Paris*, 1843, p. 692.

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how adds: "Probably some of the cases of fatal hemorrhage on record in this country (England) have really arisen from gangrenous ulceration." Carmichael⁶ related the case of a baby of five weeks, who had a feverish cervical adenitis. Respiration and deglutition became worse in two days, and the patient died in a hemorrhage. The retro-pharyngeal abscess communicated with the post-tonsillar cavity; the open artery was the external carotid.

Bokay and Alexey have recorded⁷ the case of a boy of four years, who had an inflamed throat three weeks. No diagnosis was made. Then his fever rose to 40° C., his face became œdematous, his throat red, but no local abscess or swelling was discovered. There being dyspnœa, the case was considered one of probable pneumonia. Besides, he had a nephritis—probably scarlatinous. One night there was a hemorrhage of 350 cubic cm., and the next morning another. The autopsy was made by Szekeres, under whose name this case appears in some of the records, so that it has often been counted twice. There was pus in a tonsil and in the surrounding tissue, and in a cavity of the size of a hazel nut was the perforation of the common carotid.

The new, elaborate and exact "Traité des Maladies des Enfants" has only this to say on the subject, that gangrene will sometimes advance into large blood vessels.

⁶ *Edin. Med. Jour.*, July, 1881.

⁷ *Jahrb. f. Kinderheilk.*, xvii, p. 209. 1881.

DERMOID CYST OVER THE CENTRE OF THE LARGE FONTANELLE

Av., a Cuban boy, was presented when he was eight months old, with a tumor of the size of a coffee bean over the centre of his large fontanelle. It was first noticed when the child was a few months old; at that time it had the size of a pea. The fontanelle was open and of the size it usually has at the age of eight months; pulsation could be felt through it, and crying raised it. The tumor was of the color of the scalp, not vascular, not congested, not sensitive, and covered with hair. It was not changed in size or shape by compression, but could be depressed (the fontanelle being still fibrous). Some pulsation could be felt through the tumor, and the latter would rise with forced expiration (crying). These symptoms were attributed to the condition of the fontanelle on which the tumor was situated, but the operation was postponed on account first of the possibility of a mistake, and of the increased safety of a surgical procedure in later years when ossification would have been completed.

The child was again presented in May, 1898, when he was four years and nine months old. The tumor had the size of a hazelnut, was covered with hair, not discolored, not vascular, not markedly depressible, but elastic and semi-fluctuating, and slightly compressible under bilateral pressure. It was not transparent. Its shape was spherical; it had no pedicle, but its base appeared narrower than the rest of the tumor. It was not removable from its point of attachment, which was quite firm. The skin on top, at the greatest distance from the skull, appeared rather thin. There was no pulsation in or through the tumor, and no change with exertion or with crying.

DIAGNOSIS.—Congenital dermoid cyst. No possible mistake for meningocele.

A longitudinal incision through the covering scalp

proved the skin of normal thickness. The capsule was easily found and readily separated from the surrounding tissue until the periosteum was reached. There it and the capsule were firmly adhering. In the attempt at separating them a small opening was accidentally made into the tumor, and some little of the contents was lost. The opening was kept closed with pincers. The periosteum was torn off the bone to the extent of a square cubic centimeter. This part of the periosteum which remained attached to the tumor was rather thin. During the latter part of the operation the cause of the difficulty in finishing it quickly was found in the fact that there was a depression of the bone more than half a centimeter in depth in which the lower part of the tumor was imbedded. The bone itself, with the exception of this depression, was normal; there was no hyperostosis around the depression, or anywhere else.

The tumor was found to be a cyst, both dermoid and sebaceous. Inside the part bordering on and attached to the indentation of the bone, there is a small bundle of minute hair. The microscope shows fat globules in large quantities and cholesterin crystals.

The locality of the tumor, and its contents, prove its dermoid character. It having been observed a very few months after birth, when it was quite small, and the depression of the bone, prove that it existed at an early time. There can hardly be a doubt that the duplicature of the ectoderm forming the cyst was of early fœtal nature. It is probable that where the tumor was formed ossification remained incomplete and the bone thin. In a case of Heurtaux's, in which the development of the tumor became rapid about the thirtieth year of the patient, there was no ossification at all. In most other respects the description of my case is identical, to a great extent, with all those reported. In a case of Giralvés, and in one of Arnott, there was the same apparent pulsation which I described above. In a few cases the bone was found very thin, either by absorption or by deficient ossification; in a few others there was a hyperostosis round the point of attachment in the periosteum.

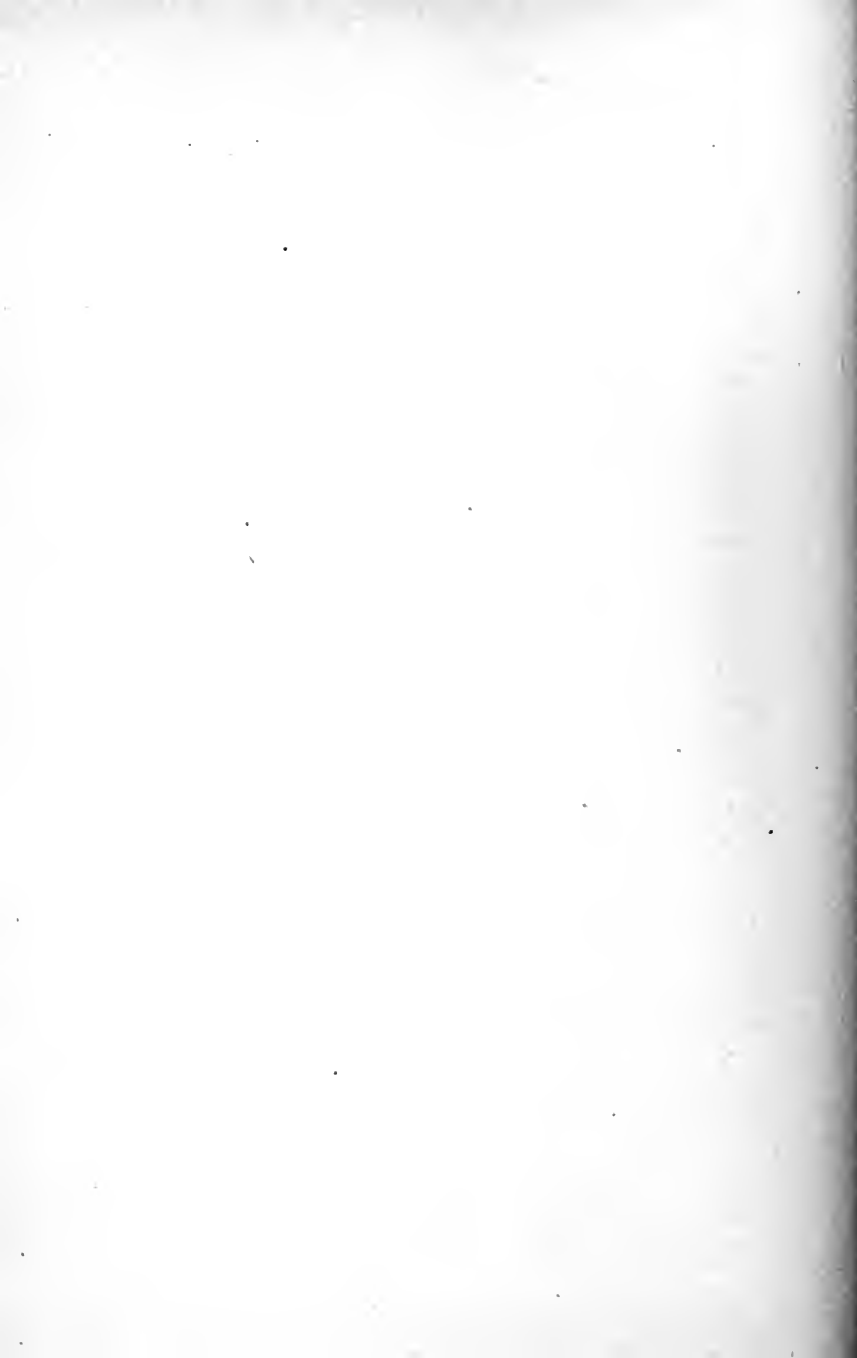
DERMOID CYST OVER LARGE FONTANELLE

The diagnosis from encephalocele, or from meningocele, may be doubtful in occasional cases. The scarcity of the former over the centre of the fontanelle should not be claimed as a diagnostic point, for cases like that described above are also rare. A meningocele fluctuates, is very transparent (but possibly may, when small, be covered by skin), hairless, and compressible; its contents can be forced back into the cranium, and may thus give rise to cerebral symptoms. Traumatic "spurious" meningocele need not give rise to cerebral symptoms, may not be (rarely is) reducible, and is covered by normal skin. When very small, it may give rise to doubts, and in some cases, when the question of an operation is raised, it will not do to be rash.

The contents are not always of the same consistency. Some contain, with the usual contents, a serum rich in sodium chloride.

A case of Sibthorpe and Hardy was not exactly over the centre of the fontanelle.

The number of cases of dermoid of the large fontanelle which have been reported is small. The first case, by Heldea (1770), was quoted by Wernher, who took these tumors to be strangled meningoceles. Picard related one in 1840; it was as large as a fist, and was observed on a woman of sixty years. Hewitt collected five cases, Giraldés fourteen. The best article on the subject known to me is that by Lannelongue and Ménard, in their "*malformations de la tête et du cou.*"



CYST OF THE OMENTUM

JOSEPHINE COSTELLO, seven years old, born in the United States of Italian parentage, was admitted to the Jacobi Ward of Roosevelt Hospital October 10, 1900. Four years previously the abdomen began to swell, and the child lost flesh and looked out of health. The diagnosis of ascites, probably of tuberculous origin, was made by the chief of my clinic, Dr. F. Huber. He performed paracentesis and drew two quarts of a clear, slightly bloody serum. The swelling disappeared, and the child improved and appeared cured. After two years the swelling, with fluctuation over the whole abdominal cavity, returned; the child lost flesh, looked bad, and was again tapped by Dr. Huber, after which the health of the child improved. There was no history of cough or of bloody or other expectoration. In the spring of 1900 the abdomen filled again, with some impairment of the looks of the child. Still she was active and had good appetite, sleep, and strength. No cough, expectoration, or sweats. When she was admitted, there was an occasional cough; there were many, but small, lymph bodies palpable in the groins and axillæ, but there was no change in the respiration of either lung, but a very slight extensive dulness in the right axilla down to the liver. The body weight was forty-seven pounds, five ounces. The kidneys and urine were negative. Abdominal circumference over last rib, 69 centimetres— $28\frac{1}{8}$ inches. Fluctuation universal in all directions.

October 22d.—300 cubic centimetres of a slightly bloody serum was withdrawn. The opening of the trocar then became obstructed, I thought, by intestinal coils, and the operation was interrupted.¹

¹ The fluid was examined, with negative result, for tubercle bacilli only.

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October 30th.—The circumference was only 23 inches; it remained so until the middle of November, when it began to increase again. Body weight on November 7th, forty pounds ten ounces; on the 14th, forty-one pounds and eight ounces. Neither the operation nor the subsequent absorption caused any change of temperature. On November 22nd the patient was transferred for laparotomy to the surgical service of Dr. Weir.

The child was operated upon by Dr. R. F. Weir under chloroform anæsthesia. The incision, two inches and a half in length, was made in the median line and commenced from a point about an inch and a half above the umbilicus, and was directed upward. A very thin-walled multilocular cyst presented itself, which, when drawn out of the abdominal cavity, contained about two quarts of straw-colored fluid in its main cavity, and was found to be incorporated in and involved the greater part of the great omentum, the cyst narrowing off into two pedicles as it approached the stomach. These pedicles of the omentum were ligated and the cyst was easily removed. The contents were mostly lost.

Two days after the operation the temperature rose suddenly to 103.2° F., and the child began to cough. During the next nine days the temperature fluctuated between 100° and 104°, rising once to 104.4° F. No observation was recorded of the possible cause of the cough. It does not appear that the temperatures had anything to do with the wound, for recovery was complete. The abdominal wound healed by primary union, dressings were omitted on the eighteenth day after the operation, and the patient was discharged, cured, on December 30, 1900.

The upper part of the specimen consists of omentum, which is cut off in two places. The cyst is large, with a number of recesses communicating with the main cyst with mostly large openings, some of them from three to five centimetres in diameter. It is covered with large and anastomosing blood-vessels and lymph-vessels, running in thick solid tissue. Between these masses of thicker tissue the wall of the cyst is quite thin and translucent. The cyst wall consists of several tissues, unstriped mas-

CYST OF THE OMENTUM

cular fibres, fat, and fibrous tissue, in layers of different thickness, traversed by enlarged blood-capillaries and lymph-capillaries. It has on both sides, both externally and internally, a lining of endothelium, such as lines blood-vessels and lymph-vessels. The gelatinous contents are finely granulated; they consist of coagulated serum, with multinuclear and eosinic forms of leucocytes, endothelial cells, and a few red blood-cells. Staining with Weigert's method proves the absence of fibrin.

Reference to cysts of the omentum is not quite infrequent but mostly indefinite. Thus, J. H. Fruitnight says in the *American Text-book of the Diseases of Children*, Philadelphia, 1894, p. 586: "Cysts are met with not infrequently. They are usually dermoid in nature, though simple serous cysts are encountered." The *American Text-book of Surgery*, 1892, p. 743, has the following only: "Cysts between the peritoneal layers of the mesentery containing serum or a sanguineous fluid have been successfully removed by operative treatment. Chylous cysts have sometimes the size of a head." In his discussion on acute sarcoma of the omentum, Koenig says that between the nodules and nodes ascitic fluid may be found in cysts, and adds that in operations for hernia Richter and Dieffenbach found an additional membrane. Cutting into it, they got into a cavity, the result of inflammation, filled with clear or bloody serum, with a portion of the omentum.

The differential diagnosis from an ovarian cyst may be easy in those cases in which the mesenteric cyst is found to be high above the pelvis, bulging, and supplied with a distinctly perceptible part of the mesentery, which appears to act as a pedicle. But these peculiarities are rare, and when the walls are thin and the size is large, a unilocular cyst may easily be and has been mistaken for ascites.

Dermoid and hydatid cysts and tuberculous tumors should be excluded from our consideration. They form a large part of the literature collected by Dowd under sixty-nine headings. With the exception of a few cases of hæmatoma and abscess, nothing remains but chylous and serous cysts. Nearly all of them, perhaps all, are of

lymphatic origin, and result either from dilatation of lymph-vessels or from a cystic degeneration of lymph-bodies, such as Rokitsansky described at an early time (*Lehrbuch der Anatomie*, p. 677). Of the first variety, Weichselbaum reported a case (*Virchow's Archiv*, xiv), and Sabourin and Le Dentu another (*Bulletins de la Société d'anatomie*, 1876, p. 339). The contents are chyle. The same should be said of the second variety, as long as the case is of recent origin, as in the cases of Werth (*Archiv für Gynäkologie*, 1880) and of Merklen (*Bulletins de l'Académie de médecine*, 1880). Werth's case is that of an omental cyst of the size of a child's head. It was described in the *Archiv für Gynäkologie* (Vol. xix, 1882, p. 321). It rose from a segment of the mesentery belonging to the small intestine. Its contents were rather thick, whitish, and looked like chalk suspended in water, and contained albuminous and fatty detritus, but no formed elements, particularly no epithelia which would permit one to trace the origin to a tissue with epithelium. The walls consisted mainly of connective tissue, coarse and fine, the latter with small spherical cells in the intestines, of pronounced lymphatic character. That is why the cyst must not be taken for an actual neoplasm, but is a cystoid degeneration of a lymph-node, which was alleged by Rokitsansky as the source of such degeneration. The latter can best be explained by a primary obliteration of vasa efferentia, which, the entrance of chyle not being impeded, must lead to retention and dilatation.

A similar cyst was described by Eppinger (*Prager Vierteljahrschrift*, 1873). This description tallies perfectly with the foregoing, and does not justify his opinion, according to which his specimen is dermoid. The latter, however, is sometimes found, and is mentioned by Klebs (*Handbuch der path. Anat.*, Vol. i, p. 331).

When cysts are of longer duration, their contents become altered, greenish, yellowish. Péan quotes Ducasset (*Bulletins de la Société d'anatomie*, 1848), who found in the multiple lymph-body cyst of a boy of four years a few recesses filled with chyle, and others with a serous

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fluid. Rokitsansky made the same observation in a man of fifty-three. In all of these the wall was thick, with the structure of the lymphatic system, and without epithelia in the interior. Thus it appears probable that the serous cysts should be considered to be chylous cysts of long duration. The number of observations is limited. In his remarks on operative treatment, Péan mentions sixteen cases of serous and fourteen of chylous cysts. In that number he is probably mistaken.

All of the three cystic tumors in Péan's personal observation exhibit a peculiarity which seems to deny them the diagnosis of a genuine mesenteric cyst, for they were attached to the posterior wall of the abdomen and appear to have got between the layers of the omentum secondarily only, during their growth and the consecutive opening of the omentum. They seem to be of retroperitoneal origin. If that is so, or, rather, as that is so, his strenuous objection to extirpation is not justified, nor is his preference for opening and drainage.

Mr. Alban Doran exhibited for Dr. Bantock to the Obstetrical Society of London (*Trans.*, Vol. xxii, 1882) a large thick-walled single cyst, removed from a woman fifty-eight years old. Its symptoms always resembled those of an ovarian cyst; it once ruptured and filled again, and several times it was tapped, dark serous fluids being removed. The great omentum was normal from the greater curvature of the stomach to its usual adherence to the transverse colon, but could be traced as a thickened and calcified sheet on to the top of the cyst, which proved to be entirely within the omentum. One fold of the latter completely separated the tumor from the normal pelvic organs. The tumor was partly adherent to this fold of mesentery and to the transverse mesocolon.

Mr. Doran also exhibited a Hunterian specimen (No. 1109, Path. Series, Museum, R. C. S.) of a small cyst in the folds of the great omentum.

Mr. N. Terry Marsh and Mr. Keith Monsarrat publish (*British Medical Journal*, March 2, 1901) a case of multilocular cystoma of the omentum which was removed from a female child three years and five months old. The

tumor consisted of a large thin-walled cyst, capable of containing ten pints, and a number of independent smaller cysts varying in capacity from eight ounces to one drachm. In some of the smaller cysts the fluid was a clear serum, but in all the larger ones it was deeply tinged with blood. The walls of the cysts, and particularly those of the large one, had numerous anastomosing vessels; they were large and thin-walled in the large cyst, smaller and firmer and more firmly imbedded in connective tissue in the smaller cysts. All of the cysts resembled each other histologically. Externally they carried an endothelial covering, internally a coat of fine connective tissue containing numerous blood-channels.

The several layers of the omentum were not traceable in the cyst walls; that circumstance, the presence of numerous large blood-vessels, and the early appearance of the tumefaction point to a foetal inflammatory process, for the abdomen was noticed to be considerably enlarged when the child was one year and four months old. At the age of one year and eight months the abdomen measured $23\frac{1}{2}$ inches. There were general fluctuation and dulness. Five weeks after admission, the first puncture was made, the second nine months later; nine months after this the third; two months and a half afterward the fourth and last. Soon afterward laparotomy was performed. There were two attachments, one in the right iliac fossa, the other consisted of the omental attachment to the greater curvature of the stomach, forming a broad pedicle for the whole mass. Recovery was complete.

In the *Report of the Proceedings of the Pathological Society of London*, 1851-1852, p. 374, Dr. W. T. Gairdner describes a cyst that was "found beneath the anterior layer of the greater omentum in a woman. It consisted of a highly transparent closed sac, between three and four inches in length, and from a half to one and a half inches in breadth, having a lobulated appearance externally, like that of the distended colon, but in no part subdivided by any approach to complete sæpta. The sac was fed by numerous vessels running within the omentum and ramifying over it in every part. The fluid in the sac was a

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transparent, colorless serum containing numerous flocculi. No parasite or ova were discovered. In the same woman were found in the cellular tissue of both groins a cluster of globular cysts of the ordinary type; similar cysts in the large uterine fibroid, and a globular cyst of the size of a bean in the pineal gland."

Thornton (*British Medical Journal*, 1882, ii, p. 1243) describes two cases of small omental cysts, both of which were found accidentally during operations on a papillomatous and a sarcomatous ovary. One was very small, multilocular, at the lower part of the omentum; the other of the size of a small coccanut, had a thick whitish wall and a puckered lining. It was attached to the omentum by a heavy vascular pedicle, under the edge of the liver.

Dr. Gooding has a case of omental cyst (*Lancet*, February 12, 1887). It had the size of a foetal head, was without a pedicle, and was imbedded in the omental folds.

Spencer Wells operated on a child of four years (*British Medical Journal*, June 14, 1890).

Dr. Buckley (*British Medical Journal*, May 16, 1885) has the case of a cyst with thick walls which contained about a quart of fluid in which were found cholesterin and fat, besides "compound granular débris."

In William Osler's *Lectures on the Diagnosis of Abdominal Tumors*, Case L, on page 123, is that of a cyst of the mesentery of the last twelve or eighteen inches of the ileum; before removal it was suspected to belong either to the omentum or the pancreas. The first tapping yielded a bloody fluid. During apparently good health the cyst filled repeatedly, nor was the health ever disturbed by or after the tapping. In the fluid cholesterin was found.

Altogether the number of uncomplicated and genuine omental cysts is small. Circumspection and careful acumen had to be called in to make the diagnosis in many cases. Thus, W. Joseph Hearn, while quoting a case of Schwartzenger's, that of a true lymph cyst in a girl of four years, reports the case of a complex hydatid cyst of the omentum (*Annals of Surgery*, June, 1897). It was observed in and removed successfully from a boy of

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eight years, who weighed, before the operation, $93\frac{1}{2}$, two weeks after 49 pounds. The abdomen was found large at birth, diminished in size after six weeks, remained comfortable six years, and then grew rapidly, until the abdomen had a circumference of 44 inches, and the distance from the ensiform process to the pubes amounted to 25 inches. Two aspirations yielded a small quantity of a brown fluid. Laparotomy removed the whole hydatid mass, which was taken out in compartments, and was found to have its origin in the folds of the omentum, below the margin of the transverse colon.

It will always be difficult to decide whether such hydatids occur primarily in the omentum or, as Schwartzenberger maintains, have their primary seat in the liver.

A case of Doran's (*Obstetrical Transactions*, Vol. xxiii, p. 165) and another of Ormby's (*British Medical Journal*, 1883, i, p. 578) originated in the ovaries.

A large intestinal cyst, 22 centimetres long, 14 broad, and 10 deep, was observed by C. Hennig (*Centralblatt für Gynäkologie*, 1880, No. 17, p. 398). Delivery was instrumental, very difficult, the child dead (lacerated). The sac contained still 100 cubic centimetres of a pretty clear, slightly red, and viscid fluid which betrayed its intestinal origin. Weigert found cylindrical epithelia on the wall and in the fluid and intestinal follicles in the wall. In the same child there was a cyst of the size of a plum, covered with cylindrical epithelium, on the anterior wall of the third, fourth and fifth cervical vertebræ (branchial probably).

Dr. W. Howship Dickinson describes (*Transactions of the Pathological Society of London*, Vol. xxii, 1871, p. 296) a mesenteric tumor that occurred in a female child of two years. It was first noticed when the infant was between three and four months old. When the child died, she weighed sixteen pounds. The tumor, together with the left kidney and a small portion of small intestine, weighed 2 pounds $5\frac{1}{2}$ ounces. It nearly filled the left half of the cavity; in front of it lay the transverse colon and the cæcum above, and a coil of adherent small intestine below. It consisted in its great bulk of ordinary conec-

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tive tissue studded with true fat, in which there were found cartilage, bone, and many cysts in which ciliated epithelium and plenty of mucoid masses were found. This teratoma should not be considered among the serous cysts under consideration.

In addition to the serous, the dermoid, and those cysts which result from cystoid degeneration of lymph-bodies, Roth (Virchow's *Archiv*, Vol. lxxxvi) describes an enterokystoma which is congenital and due to the dilatation of the omphalomesenteric duct caused by local obliteration.

Of cysts of the pancreas, Osler collected 134 cases. They are either (1) retention cysts (by inflammation or compression of the pancreatic duct, or catarrhal inflammation, or concretions or neoplasms mainly in the head of the gland), or (2) proliferation cysts depending on adenoma, epithelioma, or carcinoma of the tissue, or (3) apoplectic (A. Russow, *Jahrb f. Kind.*, Vol. liii, p. 345).



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CARCINOMAS

THE solid tumors of the abdominal cavity and the peritoneum are for the most part either carcinomatous or sarcomatous.¹ The carcinomas are sometimes, though rarely, primary, taking their origin from the endothelium of the lymphatic vessels or their interstices; mostly secondary, originating from the stomach, pancreas or colon; and, finally, metastatic, having their origin in the breasts, uterus or rectum. The sarcomas, whether spindle- or round-celled, alveolar or cystic (myxo-, lympho-, fibro- or angio-sarcomas, Nothnagel), are derived from the mesentery or the omentum.

But, with rare exceptions, these two forms are only met with in the adult. With the exception of the scirrhus form, intestinal carcinoma has a more rapid course than sarcoma (the contrary assertion in many, many books notwithstanding): its progress leads more rapidly to cachexia and more frequently to metastases. The lymphatic glands particularly are very often affected. Sarcomas are more slow and have a greater tendency to undergo complications, tuberculosis, or cystic degeneration, for instance. It is chiefly the form known as cysto-sarcoma, which

¹ Gendrin (influence de l'âge sur les maladies. Thèse d'agrégation, 1840) believed that carcinoma was not found in childhood. Several cases recorded in literature are of doubtful character. For instance, Portal (Acad. Royale des Sciences, Paris, 1771, p. 552) observed a large abdominal tumor in a child of twelve. There was vomiting during the day, but it disappeared when the patient was in the horizontal position. For this reason the doctor applied a bandage to the abdomen. The autopsy confirmed the diagnosis of a peritoneal tumor; but the nature of the tumor is not mentioned.

causes the peculiar sensation, almost pathognomonic, of pseudo-fluctuation.

The symptoms of intra-abdominal (peritoneal) carcinoma are similar to those of tuberculous peritonitis. The effusion may be encysted or free, serous, chylous, or sanguinolent. It may (but not always) contain tubercle bacilli, or isolated cancer-cells, "agglomerated, living or degenerated, sometimes vacuolated, or in the stage of fatty degeneration, large, numerous and easy to distinguish from the endothelium of the peritoneum" (Nothnagel). This celebrated author says that he has never seen a case of acute general carcinomatosis coincident with carcinoma of the peritoneum. I have been more "fortunate." For in 1870 I saw, thanks to the kindness of the late Dr. Lewis H. Sayre, a young girl of 13 (family history negative), who had become gradually emaciated in the course of the preceding year; within the past month she became cachectic, constipated and slightly jaundiced. Her abdomen increased rapidly in size; the superficial veins were very much dilated; she felt spontaneous pains which became intense on pressure. Rapid digital percussion revealed floating masses in the abdominal cavity. The inguinal and axillary glands were swollen. The lungs were intact. The heart presented nothing abnormal, except a slight functional murmur. The urine, almost free from albumen, contained no renal elements. Dr. Sayre refused to operate. At the autopsy, which took place soon after, the abdomen contained from 5 to 6 liters of a sero-sanguinolent fluid. The surface of the intestinal coils, of the liver, of the spleen, was covered with hundreds of nodules, differing in size from that of a pea to that of a hazel-nut, some even reaching the size of a walnut. The last ones corresponded to the situation of the lymphatic ganglia of the omentum and the mesentery; some adhered strongly to the intestines and were covered with a lymphatic exudation. The large solid masses which were perceptible while the patient was alive were composed of the intestines glued together by exudation, and could easily have been taken for the result of tuberculous peritonitis. The rapid, uninterrupted course, the cachexia, the extent of

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the metastases, the absence of tuberculosis in all other organs, the relatively slight elevation of temperature not pointing to acute tuberculosis, the presence of mother and daughter cells (the chief microscopic proof of cancer at the present state of science), left no doubt in our minds that the case was nothing else but peritoneal carcinoma-tosis.

I have not seen again a case of disease under this form, except once, many years later, in an adult. Concerning the case which I have just described, I will add that we were all struck by the singular fact that the pelvic organs were intact.

J. H. Rehn refers to the following five cases of cancerous disease ("Gerhardt's Diseases of Children," Vol. IV., 1880):

CASE I. Vernois, 1851. Case of colloidal cancer of the peritoneum in an infant 18 months old. Quoted by Lébert in his "Traité des maladies cancéreuses," Paris, 1851, p. 590 (*Archives manuscrites de la Société médicale*).

CASE II. Clar, 1855. The case of a boy 3 years and 9 months old: nodules varying in size from that of a pea to that of a hen's egg on the parietal peritoneum and on the intestines, with effusion in the abdominal cavity (*Oesterreich. Jahrb. f. Kinderheilk.*, I., p. 49).

CASE III. Greenwood. A case of medullary carcinoma in a boy of 5, situated on the parietal and vesical peritoneum (*Lancet*, July 21, 1877).

CASE IV. Gnäudinger. The case of a boy 22 months old. Carcinoma of the mesentery, sanguinoleus effusion into cavity (*Jahrb. f. Kinderheilkunde*, 1877).

CASE V. Widerhöfer. A case of colloidal cancer of the peritoneum of the left lobe of the liver in a newborn infant, 3 days old (*Jahrb. f. Kinderheilk. u. phys. Erziehung*, II., p. 191).

Widerhöfer observed a case of medullary carcinoma of the peritoneum, with carcinoma of the kidneys and the lower portion of the ileum in a boy seven years old; and another case of carcinoma of the lymphatic glands with secondary carcinoma of the great omentum, in a boy 2 years old ("Gerhardt's Diseases of Children," Vol. IV.,

1880, p. 446). The same author reports a case of carcinoma in an infant, which terminated in death through intestinal hemorrhage, when the child was 16 days old. The seat of the cancer was the origin of the portal vein and the retro-peritoneal glands.

Most of these cases can also be found in the writings of Ad. Glockner on the so-called Endothelial Cancers of the Serous Membranes (*Zeitsch. f. Heilkunde*, xviii., 1897).

The case reported by Rokitansky as an alveolar colloidal cancer of the peritoneum of the liver, the spleen, the diaphragm, and the intestine, was very probably a case of sarcoma.

K. Stern published in 1895 a case of carcinoma of the mesentery.

R. Fraundorfer published a case of adeno-carcinoma of the mesentery in a boy 3 years and 6 months old. The first symptoms made their appearance several months before the little patient was presented for treatment. He died a month later (*Inaug. Dissert.*, Munich, 1901).

Two cases of peritoneal carcinoma are briefly mentioned in the "Transactions of the New York Pathological Society," Vol. II., 1877.

In the first case, that of a child of 15 months, the tumor had started in the left kidney or in the mesentery, developed rapidly, filled the abdomen and extended into the scrotum through the left abdominal ring. The other case is that of an abdominal encephaloid tumor in a child one year old.²

G. Sürgens published a thesis (Freiburg in B., 1902) on "a case of epithelioma of the peritoneum in a child." The boy was eleven years old and the tumor was very large. By aspiration 3300 cc. (110 ounces) of a clear yellowish fluid was removed; the second aspiration yielded 4000 cc. It was necessary to repeat the operation twice more. Findings at the autopsy: Miliary (?) tubercles

² The malformations of the ductus omphalo-mesentericus (M. Roth, *Virchow's Archiv*, 1881, p. 372) are not strictly parietal and do not belong here.

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in the lungs; diaphragm thickened; peritoneum and pelvis covered with solid pus; white nodules on the hepatic veins. The microscope reveals the epitheliomatous character of the tumor.

Primary carcinoma of the peritoneum is very rare; heredity plays here no part; if it did, cases of carcinoma in children would be much more frequent. One fact is certain and that is, that a malignant tumor in infants or in children is much more frequently a sarcoma than a carcinoma. Both varieties of tumors, whatever may be their microscopic structure, present some symptoms in common. These symptoms are caused not by the displacement of normal tissues, for a benign tumor acts in the same manner; not by the metastases, for occasionally even a myoma or a chondroma can cause them; nor by the rapid growth and extension alone; they are caused by the disintegration of the neighboring tissues, a disintegration of such a degree sometimes (particularly in soft carcinoma), that it is impossible to make out the limits of the tumor.

SARCOMAS

The great majority of malignant tumors in infants and older children are sarcomas, but they are not frequent in any part of the peritoneum.

F. R. Rathery (Essay on the Diagnosis of Intra-abdominal Tumors in Children, Paris Thesis, 1870) cites only case of sarcoma in this region. Ablon (Paris Thesis, 1898) cites a case of sarcoma of the mesentery and of the small intestine in a little girl of five, observed by Pepin (Société d'anat. et de phys. de Bordeaux, November 16, 1891) and one of primary sarcoma of the sigmoid flexure reported by de Brünner (Zurich Thesis, 1883). No operation or autopsy in either case; death was caused by peritonitis.

G. Trinke (*Cincinnati Lancet-Clinic*, 1884, p. 502). Boy of five; felt pain after a fall; hardness between the right inguinal region and the umbilicus. Operation (not finished); tumor adherent to the anterior abdominal wall, the omentum and the intestine. Autopsy: round-cell sarcoma, size of a goose-egg, in the meso-ileum.

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Sawers reports a case of lympho-sarcoma with colloid degeneration in a boy of five (Koenig, *Lehrbuch d'Chirurgie*, 1893).

Barès reports a case of sarcoma of the mesentery and the omentum in a boy of eleven (Oscites in Children, Paris Thesis, 1887). No operation. At the autopsy the contents of the abdomen were of the color of milk, with lymphatic corpuscles in the state of fatty degeneration.

H. F. Formad reports the case of a boy of 8, with the history of a blow. The autopsy revealed a very large lymphadenoid sarcoma of the mesentery and the mesocolon (*Trans. Pathol. Soc.*, Philad., 1891-1892, p. 298).

E. Doernberger reports the case of a round-celled sarcoma attached to the parietal peritoneum on the right side in a boy of four (*Münich. Med. Wochen.*, 1895, p. 817).

J. O. Warren reports the case of a boy with the symptoms of appendicitis. Operation revealed a round-celled peritoneal sarcoma at the ileo-cecal junction (*Boston Med. and Surg. Jour.*, Vol. 138, 1898, p. 177).

Letailleur gives the report of a case of round-celled sarcoma of the mesentery and of the retro-peritoneal glands in a boy of two (*Contribution à l'étude du sarcome des enfants*, Lille, 1895).

Harris and Herzog (published "Annals of Surgery," 1897) the case of a boy of five who had a lympho-sarcoma of the entire abdominal cavity. It had its origin in the mesentery of the small intestine. A part of the jejunum was resected in the operation. Cure.

Henoch (*Reports of the Charité*, viii., p. 557) reports the case of a peritoneal sarcoma in a boy of eleven, which followed a very rapid and malignant course. There were numerous lympho-sarcomas of the parietal and intestinal peritoneum, of the size of a fist, there was chylous oscites with innumerable leucocytes, and hemorrhages from the perforation of the mucous membrane.

L. Concetti presented a case of malignant lympho-sarcoma of the mesentery and the small intestine in a boy of five (*Soc. Ital. de Pediatria*, June 23, 1903). The course was rapid, death ensuing in three months. The symptoms were: abdominal pains, tumor, cachexia, anemia,

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edema, prostration. Autopsy showed a tumor the size of an orange in the mesenteric glands, encroaching upon a part of the intestine. A metastatic focus in the liver, the kidneys also invaded. Microscopic examination showed a sarcoma of the small round-celled variety.

Gildemeister reports a case of angio-sarcoma in a girl of eight. Operation followed by death. (Breslau thesis, 1902.)

LIPOMAS

Lipomas in the peritoneal cavity have been described by a number of authors. Péan described them in adults, in the connective tissue of the serous parietal layer of the mesentery, as well as in the subserous tissue; they are more frequent in women. Some undergo calcareous degeneration, some are pediculated. Waldeyer described a myolipoma of the omentum and the mesentery weighing 8 pounds in a boy of eleven who weighed 145 (?) pounds and who died of endocarditis and of fatty degeneration of the liver.

I have found a well-defined lipoma in the epiploic appendage.

F. Cima reports a case of lipoma of the mesentery in a boy 22 months old. Operation. Death (*La Pediatria*, 1896, p. 141).

FIBROMAS

Fibromas are, in all ages, rare in the peritoneum or the intestine; they are found occasionally extra-peritoneally. A fibromatous peritonitis, where the meso-colon was covered with fibrous granulations, is mentioned by Curtis in the "Twentieth Century Practice of Medicine" (Vol. VIII., p. 493). I have not seen a case either in a child or in an adult.

Masset (Fibromas of the Mesentery, Lille Thesis, 1894) has published three cases of fibromas in girls of ten, fifteen and sixteen, respectively. The first was cured, the other two died.

P. Hackspill (Würzburg Thesis, 1898) cites the case of a myxomatous cavernous fibroma of the mesentery in a

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girl of nine. The autopsy showed that the tumor had been traversed by the iliac artery and vein.³

VARIOUS LYMPHATIC TUMORS

The lymphatic ganglia of the abdominal cavity are subject to changes from very diverse causes. Hyperemia, hypoplasia, atrophy, inflammation or degeneration may follow a simple catarrhal enteritis, intestinal ulceration or the chronic, but more frequently the acute bacterial infections, such as typhoid fever, dysentery and scarlet fever. Pathologic changes may also take place in chronic diseases, such as alcoholism, syphilis, leukocythemia, pseudo-leukemia and Addison's disease.

Malignant degeneration is rare. Lymphatic tumors of tuberculous origin are more frequent; they are sometimes, but not often, complicated with tuberculosis of the lymphatic ganglia in other parts of the body. The complication with angioma is rare.

Tuberculous lymphatic ganglia of the mesentery or the omentum may be of very large size. They are indolent except when they cause inflammation or adhesion. If not flexed by adhesions, they are very movable, even more so than fecal tumors or a floating kidney. When they are in the omentum they can be felt in the median line, below the umbilicus; and when adherent to the liver they are movable with the respirations. They sometimes change in size during life, for they are not always of uniform composition. Some tumors which appear tuberculous, may in reality be only inflammatory. Such an inflammatory exudation, often of rapid development, is very apt to be absorbed, so that the size of the swelling becomes considerably reduced. Their influence on the neighboring organs depends partly on their size, but chiefly on the adhesions which they may form. These adhesions may pro-

³ This thesis treats of abdominal tumors in general and contains the most complete collection that I have seen. Nevertheless, there are some omissions. For instance: My essay published in the Transactions of the Copenhagen International Congress (1884) in which is emphasized, for the first time, the difference between carcinoma and sarcoma of the kidney in the fetus and in the infant. (See page 183 of this volume.)

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duce a compression or a contraction of the intestines, followed by mild or dangerous symptoms (constipation, volvulus).

The tuberculous foci on the parietal peritoneum are generally not so large. But they may be very numerous, not only in acute miliary tuberculosis, but also in the chronic form. They may appear under the form of large tumors when they adhere to the intestines and when these themselves form adhesions.

The intra-abdominal ganglia, like those of other regions, participate in the adhesions caused by leukocythemia, pseudo-leukemia and syphilis. They do not interest us here except in so far as they may cause difficulties in diagnosis.

There are many cases of these tumors, both in literature and in practice. They are never devoid of interest and they often present great difficulties for the diagnostician.

CYSTS

Some forms of peritonitis are very apt to give rise to cysts or to changes which resemble cysts. A peritonitis, acute or chronic, general or circumscribed, may end in very extensive adhesions and sometimes in cysts. An encysted peritonitis of traumatic origin was described by J. L. Petite (*Épauchement dans le bas-ventre, Mémoires de l'Académie royale de chir., 1735*). Foix has written a thesis (in 1875) on circumscribed peritonitis in the upper portion of the abdomen; however, he does not seem to have made any distinction between simple adhesions and cystic formations. Bernutz and Goupil have observed in women, after childbirth, peritoneal cysts resulting from pelvic and abdominal inflammation. Such cysts must not be confused with serous, sanguinolent, purulent or hydatid cysts, which are situated in the extra-peritoneal connective tissue, whence they can be removed by an operation.

Péan (*Diagnosis of Tumors, Vol. I., p. 325*) reports the case of a young child, which had received a blow in the umbilical region. Some time after a circumscribed tumor made its appearance, extending from the umbilicus to the xyphoid cartilage. There was no suppuration and the tumor appeared to be situated in the cul-de-sac of the

great omentum. Aspiration or puncture was not permitted.

Grüneberg (*Deut. Med. Wochensch.*, 1896, p. 376) reports the case of a girl of eight, who had a fluctuating tumor low down in the right side of the abdomen, from which was removed a litre of pus. The patient died three days after the operation.

In his dissertation on acute sarcoma of the omentum, Koenig says that the cysts contain an ascitic fluid and adds that in their operations for hernia, Richter and Diefenbach found an adventitious membrane, the result of the adhesive peritonitis. On dissecting off this membrane a cavity was found containing a clear or somewhat bloody serum, and a portion of the omentum.

As peritonitis is apt to cause swellings which may be taken for tumors, so tumors, except those that are round and symmetrical, are apt to cause peritonitis either general or circumscribed.

Ulcerations and perforations caused by a tumor will produce a peritonitis (Péan, *Diag. et Trait. des Tumeurs*, etc., Paris, 1880, I., p. 305). Such a secondary peritonitis, with its organized exudation and the agglutination of the intestines, will often increase the apparent dimension of the original tumor.

The ideas concerning cysts of the omentum are rather vague. Literature on the subject has been quoted, and a case in my own personal practice has been described on page 323 of this volume.

Ducasset (*Bull. Soc. Anat. de Paris*, 1848, p. 67). Boy four months old, diarrhœa, vomiting, fever, death. Autopsy: two mesenteric cysts in the umbilical region containing a yellow fluid.

Winniwartes (*Jahresber d. Kronprinz Rudolf Hosp.*, 1877, II., p. 312). Boy four months old, large fluctuating tumor in the right hypochondrium, containing 3040 cc. of a milky liquid. Death soon after.

Witzel (*Deut. Zeitsch. f. Chir.*, 1885, p. 141). Girl of ten, quite a solid abdominal tumor; on operation, however, it was found to contain nothing but a yellowish fluid. Recovery.

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F. Trompeta (*Arch. et atti de Soc. Ital. di Chir., Napoli*, 1888, p. 234). Girl of ten, pain, vomiting, diarrhœa, death. Autopsy: general peritonitis. To the right and below the umbilicus a pediculated mesenteric tumor. The cyst contained a milky fluid.

B. Schwartzenger (*Beit. z. Klin. Chir., Berlin*, 1894, XI., p. 713). Girl four years and nine months old. Lymphatic cyst in the omentum. Operation. Recovery.

Robinson (*Brit. Med. Journal*, 1891, I., p. 219). Girl of two, large tumor extending from the left hypochondriac region to the pelvis. Operation. Cyst containing two litres of a yellow fluid. Death.

E. Delmez (Cysts of the Mesentery, Paris Thesis, 1891). Child four months old, diarrhœa, vomiting, death. Two cysts in the form of pockets, containing a whitish serum.

A. Manzoni (*Gazz. Med. Lombard., 1894*, Vol. 53, p. 376). Girl of eight, tumor in the right hypochondriac region. Cyst in the mesenteric folds, surrounded by a coil of intestine. Operation. Recovery.

F. Eve (*Proc. Royal Med. and Surg. Soc., London*, 1897-1898, X., p. 18). Boy eleven weeks old, fluctuating tumor. Operation reveals cyst, size of an orange at the free border of the mesentery. Recovery.

F. Eve (*ibidem*). Boy three and a half years old, intestinal obstruction, incessant vomiting. Operation. Cyst containing a litre of serous fluid. Death.

Nasse (*Central Cl. f. allg. Pathol. un. Pathol. Anatomie*, 1895, V., p. 238). Boy of six, intestinal obstruction, enterocystoma of the mesentery of the small intestine. Recovery.

Lion (*Ein Fall von Lymphyste des Ligamentum Uteri latum*. Berlin, 1896). Girl three and a half years old. Operation reveals cyst containing 4800 cc. of a yellow fluid. Recovery.

Gehring (*Zeitsch. f. Physiol. Chimie*, 1895, XX., p. 462). Child five months old, two and a half quarts of a milky fluid. No details.

H. Maass (*Arch. f. Kinderheilk.*, 1897, XXIV, p. 42). Baby girl of seven months, very dilated abdomen, cachexia,

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green fetid stools. Operation. Cyst adherent to the liver. Death.

Stratton (*Schmidt's Jahrb.*, 1894, Vol. 253, p. 265). Girl of six. Operation. Mesenteric cyst containing three litres of a clear serous fluid. Extirpation of cyst. Recovery.

Letulle (*Bull. et Men. Soc. Anat. de Paris*, 1899, Vol. 74, p. 521). Child seven years old. Operated on by Brun. Round cyst containing 350 cc. of a serous fluid.

O. Salazar (*Med. Contemporenea*, Lisbon, 1901, Vol. XIX., p. 150). Girl of seven, intestinal obstruction. Movable tumor. Cyst. Extirpation. Recovery.

C. Kollock and S. C. Cheraw (*Trans. S. Carol. Med. Soc.*, 1888, p. 83). Boy fourteen years old, tumor of the mesentery of traumatic origin, probably cystic (exact character not indicated). Operation. Recovery.

Gildemeister (*Beitrag. z. Kenntniss d. Mesenterial Tumoren*, Breslau, 1902). Boy of three, cyst of the mesentery of the small intestine. Recovery.

Spencer Wells operated on a girl of four (*Brit. Med. Jour.*, June 14, 1890), who had an enlarged abdomen from her earliest days. The dulness on percussion and fluctuation was general, particularly in the lower part of the abdomen. Aspiration yielded 1500 cc. (over 3 pints) of a clear serum containing little albumin. The swelling slowly returned. A year later another operation for extirpation of the cyst was performed and was followed by complete cure.

N. Perry Marsh and Keith Monsarrat published (*British Medical Journal*, March 2, 1901) a case of multilocular cyst of the omentum, removed by operation in a girl three years and five months old. The tumor consisted of a large cyst with thin walls, of a capacity of 5070 cc. and several smaller independent cysts with a capacity varying from 228 cc. to 0.035 cc. In several of the smaller cysts the liquid was a clear serum, but in the larger ones it was strongly tinged with blood. The walls, particularly of the larger cysts, contained numerous anastomosing vessels; the latter were large and thin-walled in the large cysts, smaller, stronger and embedded in connective tissue in the smaller ones. Histologically all the cysts

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were alike. Externally they were covered with endothelium, while internally they were lined with very fine connective tissue containing numerous blood vessels. No trace of the various layers of the omentum could be found in the walls of the cyst; this fact, the presence of numerous large blood vessels, and the early appearance of the swelling were attributed to inflammatory action in the fetal state, for it was noticed that the child's abdomen had considerably increased in volume when it was only 16 months old. At 20 months its abdomen measured 59.8 centimetres. There was general fluctuation and dullness.

Five weeks after admission the first tapping was done; nine months later, the second; nine months after the second, the third, and two and a half months later the fourth and last tapping was performed. The four tapplings yielded 912 cc., 1368 cc., 1140 cc. and 456 cc., respectively. The liquid removed by the first tapping was of a dark brown color and contained a little blood. The liquid obtained from the last puncture seemed to be pure blood. Soon after this, the laparotomy was performed. There were two adhesions, one in the right iliac fossa, the other between the omentum and the greater curvature of the stomach, forming a large pedicle for the entire mass. The recovery was perfect.

In cysts of long duration the contents become changed, assuming a greenish, yellowish color. Péan quotes Ducaset (*Bull. de la Société d'anatomie*, 1848) who found in a multiple cyst of the lymphatic ganglia (in a boy of four) some compartments filled with chyle, and others filled with a serous fluid. (Rokitansky made the same observation in a man 53 years of age.) In all of them the walls were thick, having the structure of the lymphatic system, and devoid of epithelium in the interior. It is therefore likely that serous cysts ought to be considered as chylous cysts of long duration. The number of observations is limited. In his remarks on surgical treatment, Péan mentions sixteen cases of serous cysts and fourteen of chylous cysts. He is probably in error in reference to the last number. Each of the three cystic tumors which came under his personal observation presents some characteristic which seems to remove it from

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the class of true mesenteric cysts, for all of them were attached to the posterior abdominal wall and only seem to have penetrated between the layers of the omentum secondarily. They seem to be of retro-peritoneal origin. If this is so, or rather, this being so, his objection to extirpation and his preference for opening and drainage are not justified.

Blood cysts result from hemorrhage into serous or chylous cysts, or from the central softening of a lipoma, or from a large hematoma (in the same manner in which cysts of the dura mater develop). The cyst described by Eppingen (Prager Viertel, 1873) is not, as he assumes, a dermoid cyst, but one of the variety just described.

A mesenteric cyst causing intestinal obstruction has been described by E. A. Colby (*British Med. Journal*, March 26, 1898). The case was in a child seven years old. The first symptom was an attack of sudden pain, which reappeared the following day. Cathartics and enemas brought no relief. Eight days after the first attack of pain, vomiting commenced, and the peristaltic movements became visible. Even during the operation, the vomiting of fecal matter continued. The cause of the obstruction was found to be a mesenteric cyst of the small intestine. It was of the size of a cocoanut and contained 300 cc. of a pinkish liquid of a sp. gr. of 1023; examination showed the presence of albumin and cholesterin. The walls of the cyst consisted of fibro-cellular tissue with smooth muscular fibres. The operation was successful (quoted by Treves in *Intestinal Obstructions*, 1899, p. 272).

TERATOMAS AND DERMOID CYSTS

These tumors are not frequent in the peritoneum of young children. Dr. W. Howship Dickinson describes a mesenteric tumor in a little girl of two (*Transactions of the Pathol. Society of London*, 1874, Vol., XII., p. 296). This tumor was noticed first when the child was three or four months old. At its death the child weighed 7250 grams; the tumor, together with left kidney and a small portion of the small intestine, weighed 1062 grams.

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It filled almost the entire left half of the abdominal cavity; the transverse colon was in front of it, the cecum above it, and below it was adherent to a coil of the small intestine. For the greater part it consisted of ordinary connective tissue, studded with true fat, which contained cartilage, bone and numerous little cysts with ciliated epithelium and quantities of mucoid matter.

Gerhardt observed a large dermoid cyst in the mesentery of a baby a year old (Seidel *Jenosche Zeitsch.*, II., p. 356). A dermoid cyst of the mesentery is reported by Koenig (*Deut. Zeit. f. Chirur.*, XXXIV., 1892). A dermoid cyst of the omentum is reported by Bonfigli (*Rivista Clin. di Bologna*, 1875). Besides its mucoid contents, it also contained hair and two teeth. One of the ascending meso-colon is mentioned in the *Berl. Klin. Wochenschrift* for 1895, No. 36. It was covered with endothelium. Identical cases were observed by Hahn (*Berl. Klin. Wochen.*, 1887, No. 23), Pagenstecher (ibidem, 1895, No. 42), Frentzel (*Deut. Zeitsch. f. Chir.*), and others.

Mayer reported (*Wiener Klin. Wochen.*, 1898, p. 47) a dermoid cyst of the mesentery in a woman of 42, which contained many black hairs 8 to 10 centimetres (3 to 4 inches) long.

Studsgaard (*Centralbl. f. Chir.*, 1894, p. 403) reports a cyst (undoubtedly congenital) in a girl of fourteen, which contained hypertrophied glands of Lieberkühn and intestinal tissue.

Spencer Wells (*Brit. Med. Jour.*, June 14, 1890) operated on a girl of 19 for a dermoid cyst of the omentum. This tumor was almost taken for hydatids of the liver; it was somewhat movable, weighed 31 kilograms, contained a yellowish semi-solid fluid of fatty appearance, holding in suspension tufts of hair. Flattened epithelial cells connected by fatty matter were found by the aid of the microscope. The operation was entirely successful; there was, however, a slight discharge from a fistula which persisted for several years.

Arnott (*Transac. Pathol. Soc. London*, 1871-1872, XXII., p. 296) reports the case of a girl of two, in whom the autopsy revealed a round tumor behind the peritoneum,

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adherent to the colon, hard, rigid, and containing fibroid tissue, fats and cartilage.

Tillaux (*Gaz. des hôpitaux*, 1886, p. 157, quoted by Leon Gallez in *Diagnostic des tumeurs du ventre*, Paris, 1890, p. 353) has observed the following case: Woman, 22 years old; the abdomen presents a distinct area in its upper half; the left flank seemed particularly prominent and this prominence extended into the left hypochondrium and into the epigastrium and umbilical region. The lower part of the abdomen seemed unaffected. Palpation showed a tumor well defined below by a rounded border. The superior border was somewhat more difficult to feel, disappearing under the false ribs, at the level of the left hypochondrium. The consistence of the tumor was firm, its surface lobulated; it could be made to move slightly, vertically and horizontally. When the patient changed her position there were areas of resonance in front of the tumor, due to the interposition of intestinal coils. The genital organs were normal. It was not a tumor of the spleen; it had its seat in the left flank, and was not in the hypochondrium. Tillaux diagnosticated a solid tumor of the left kidney and a sarcomatous tumor of the mesentery. The operation revealed a bony anomaly resembling somewhat a dermoid cyst and situated in the posterior cavity of the omentum. The tumor was congenital.

HYDATID CYSTS

Taken all in all, the number of true, non-complicated cysts of the omentum is quite small. In many cases one must be exceedingly circumspect in arriving at a diagnosis or in classifying them. Thus, Dr. W. Joseph Hearn, in quoting Schwartzberger's case in a girl of four, which was a true lymphatic cyst, reports it as a case of complex hydatid cyst of the omentum (*Annals of Surgery*, June, 1897).

A hydatid cyst was removed successfully in a boy of eight, who before the operation weighed 42,536 grams and 22,644 grams two weeks after. At his birth it was noticed that he had a large abdomen, which after six weeks diminished in size, remaining normal for six years,

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then began to enlarge rapidly until it reached a circumference of 1.1 metres, the distance between the xyphoid cartilage and the pubis being 635 millimetres. Two aspirations yielded a small quantity of a brown liquid. By laparotomy the entire hydatid mass could be removed, though only in sections. The hydatid, it was found, had its origin in the folds of the omentum, underneath the border of the transverse colon.

It will always be difficult to determine if such hydatids originate primarily in the omentum or if they have, as is maintained by Schwartzberger, their initial seat in the liver.

Gallet quotes a case of hydatid cyst reported by Francesco Cimbali (*Rivista Clin. di Bologna*, 1887, p. 698) in a young man of 18, who must have had it for a long time, without suffering from it, until he was taken with acute peritonitis which proved fatal.

Almost all the cases of this nature are found in adults.

But J. Schmidt (*Schmidt's Jahrb.*, 1835, V., p. 301) reports the case of a girl of eight, who had a tumor which grew rapidly and interfered with respiration. Five and a half kilograms of the tumor were removed. Patient died six days later. Autopsy: hydatid tumor of the colon, weighing seven and a half kilograms, apparently originating from the peritoneum, and containing cheesy matter. Bouchut (*Gaz. des hôpit.*, 1862, p. 353) reports a case of hydatid cyst of the mesentery on the right side. Operation. Recovery. Quain (*Union Méd.*, 1860, VII., p. 414) reports a case in a boy of eight. Aspiration revealed the echinococcic nature of the contents. Recovery. Baudet (*Jour. de Bordeaux*, 1890, p. 309) also reports a hydatid cyst in a boy of ten. Recovery.

DIAGNOSIS

The diagnosis must be made between adiposity, tympanites, phantom tumors, ascites, dilatation of the bladder, hepatic and sub-phrenic abscess, perihepatitis, hematocele, extra-peritoneal cysts (Boyer) which can cause internal adhesions, solid tumors (lipomas, fibromas, sarcomas), intestinal tumors, perityphlitic and other abscesses, etc.

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The dorsal position, flexion of the legs, a warm bath, an anesthetic, the expulsion of gas or of the ascites, the presence of borborygmi, examination of the rectum, pain at the McBurney point, the pain caused in numerous cases of appendicitis by the patient slowly raising himself. When in the prone position he slowly extends and abducts his right leg (Meltzer), the position of the colon in front of the tumor when the latter is renal, and behind the tumor when it is hepatic and plenic, the classic symptoms of invagination in very young patients, dulness on percussion, modified or not modified by the presence of gas—all these are important points, to aid one in arriving at a diagnosis.

Ascites is never idiopathic. It is the result of venous engorgement (portal, cardiac, pulmonary or pleural) or of renal disease, of hydremia, of an irritation or inflammation caused by local disorders (peritonitis, tumors). The quantity of liquid varies between one which can hardly be diagnosticated and one which is almost incredible. I have withdrawn more than 20 litres (quarts) of fluid in one paracentesis of an ascites of scarlatinal nephritic origin in a boy of nine. The serous fluid may contain little salts and a small percentage (0.3 or 0.4 per cent.) of albumin. The albumin is increased in inflammatory cases and when the contents of the abdominal cavity are more or less sanguinolent. The latter condition is generally found in carcinoma, and, of course, also in cases where we have to deal with a hemorrhagic diathesis. Hemorrhages in the abdominal cavity yield masses which can be palpated and which in some cases disappear entirely. When ascites is complicated with tumors, malignant or benign, they are generally small, though numerous. Tuberculous masses are large and are almost never accompanied by very copious effusions.

Obstinate constipations, or those which are complicated or alternate with diarrhœa, sometimes render, but for a short period only, the diagnosis of tumors difficult. Chiefly in the colon one finds hard, compact masses, which have been taken for lymphomas or even worse. It is not always possible to dislodge them, but in the end we will

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succeed by the aid of purgatives and rectal injections. Strangulated hernias do not cause fecal tumors, vomiting being the earliest and most important symptom, besides the constipation. Intestinal invagination produces swelling in the right or in the left side, or it may by protruding into the rectum produce a narrowing of that organ. What I have, during the past forty years, described as "congenital constipation" due to an inordinate length of the sigmoid may give rise to constipation and the accumulation of hard fecal masses. In a still higher degree is this the case when we have to deal with congenital dilatation of the colon, correctly described for the first time by Hirschsprung in 1887. This last form is not frequent and there are undoubtedly cases in which the gradual dilatation of the colon resulting from curvature of the sigmoid and congenital dilation of the colon are not diagnosticated. Such was the case of a young boy of thirteen, who was to be operated upon for the excision of a so-called pelvic sarcoma. A surgeon friend of mine was to do the operation. At his manual examination, scooping of the rectum, purgatives and enemata cured that "sarcoma."

Worrall (*Med. Rec.*, 1888) reports a case of a girl of thirteen on whom a laparotomy was performed for a "malignant" tumor which proved to be fecal. I will add that one must remember that there may be a complication of both, dilatation and fecal obstruction due to the presence of a tumor compressing the intestine.

Phantom tumors are the result of tympanites with or without contraction of the abdominal muscles. It was this last variety (without contraction) which was chiefly considered by Paget and Potain. In adult women phantom tumors are due principally to fear of pregnancy or the fear of a tumor. In children of nine and over I have seen phantom tumors resulting exclusively from hysteria. The size varies, they are not sensitive, the sound on percussion is resonant; if the percussion is continued it may produce a temporary sinking feeling or collapse. For the purposes of diagnosis it is well to remember that the tumor disappears during sleep or in a warm bath

(not always), or under the anesthetic influence of chloroform or ether. But still it is not always easy to diagnose them. One must remember that they may be localized and may last weeks and months. They are easily distinguished from meteorismus and tympanites (the former being an acute, the latter a chronic dilatation by gas), which are the result of a paralysis of the muscular layer of the intestines, caused by catarrh, peritonitis, intestinal putrefaction or to an obstruction from nervous, mechanical or anatomical causes. When they are situated in the small intestine, the abdomen appears rather pointed, when they occur in the colon, the swelling is more rounded, more uniform. In the latter case it is difficult to percuss the liver and the spleen, and the veins of the abdomen are dilated.

PROGNOSIS AND TREATMENT

The prognosis is quite favorable in benign tumors (cysts) when it is possible to remove them. The number of cures will increase with the improvement of the surgical technique. The complicating ascites requires paracentesis whenever there is severe dyspnoea and circulatory disturbance. There are cysts which can be cured by incision and drainage, but enucleation is preferable whenever possible. The inflammatory, non-purulent peritoneal tumors are improved by the application of hot or cold water or ice (depending upon the patient's condition), by rest, by the administration of mercury or iodine, and by a good deal of time. The tuberculous lymphatic swellings are often improved by cod-liver oil, guaiacol, preparations of arsenic, besides general anti-tuberculous measures. Sarcomas and adeno-sarcomas are improved, but not cured, by arsenic, in slowly but constantly increasing doses, given well diluted. Gradually, almost "incredible" doses are tolerated. Sarcomas should be removed by operation; the prognosis is favorable, because metastases are not frequent. In this respect the carcinomas are worse, because metastases are more frequent and more rapid; besides, it is often impossible to make the diagnosis at the proper time.

DR. TYNBERG'S PYGOPAGUS

Two female children were born April 15th, 1895, in 342 East Forty-second Street, New York, in the presence of Dr. Sigmund Tynberg, with whose name the newcomers ought to be handed down to posterity. Confinement was easy, the head of one fœtus being soon followed by the lower extremities of the other, and the rest of the joined twins. The placenta was single, also the cord which divided into two branches two inches from its velamentous insertion. The twins are united below the third sacral vertebra, the sacra are united on one side, so that the babies can lie almost alongside each other; and one side, or posture, may be called front, the other back. The diameter of the juncture is about one and one-half inches. The back of the children are straight, the upper sacral vertebræ are distinct, the lower and the coccyx are single. From one side (the anterior) the finger presses in to a great distance; not so on the opposite side. On the former the tubera ischii are very marked. There are two vaginæ, two clitorides, two urethræ (the children do not micturate simultaneously), four labia minora, but only two majora which surround the two sets of genital organs.

There is one anus, but the rectum is double, has at least a septum; two silver probes introduced do not touch each other. The babies begin their efforts to defecate simultaneously.

Tickling on the soles of the feet of one produces no effect on the other child. They live a separate life. One cries in the night and sleeps in the daytime, the other follows opposite rules. The mother looks pale and worn in proportion.

Pulse in one fœtus 122, in the other 126, both in the upper and lower extremities. Both babies are thriving.

In the following I shall give a brief outline of the his-

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tory of pygopagus, which will show that Dr. S. Tynberg's case is the fourteenth on record.

Amb. Paré (*Opera Paris*, 1582, p. 734) has two cases:

CASE I.—Two girls were born, 1475, at Verona, "sibi dorso abi imis humeris et nates usque arctissime cohaerentes."

CASE II.—"Anno dom. 1486, at Hildebergam in Agri Palatini pago Robarchio (Rohrback, near Heidelberg), gemelli duo nati sunt dorsibus cohaerentes et hermaphroditi ambo." (Males with a high degree of hypospadias.)

In both cases a fair part of the vertebral columns, besides the sacra, appear to have been in common. The latter case is also mentioned by Licetus, de Monstris, Amst., 1665, p. 80.

CASE III.—Treyling's case is found in *Acta Phys.-Medica Acad. Cæsareæ Leopoldino-Carolinæ*, Not curios. exhibentia Ephemerides, Tome v. observ., 133, p. 445.

"Gemellæ mediantibus ossibus coccygis sibi invicem connatæ" were born 1700, in Kolndorf, Krain, Austria. A Vienna surgeon tried to separate them with a medicinal caustic. The girls lived but four months. Every organ was normal but the coccyx, which was common to both. The rectum was double, but the anus single.

CASE IV.—Helena and Judith, the Hungarian girls, were born Oct. 26th, 1701, and died when twenty-two years old (Torkos in *Philos Trans.*, vol. 50, part i., 1757, p. 311; *Werther disputatio med. de monstro Hung.*, Lips., 1707. Joh. Mich. Eccardus Diss., Kiliæ, 1709. Geoffroy St. Hilaire.

They could walk forwards and backwards, but slowly. Anus was common, it lay between the right thigh of one and the left of the other. Vulva was single.

Defecation was simultaneous, micturition was not. Judith became hemiplegic and had convulsions, also hysterical attacks. Helena never suffered. One had pertussis, the other was spared. Menstruations differed in time, amount, and symptoms. Judith was taken sick, and both died after a fortnight. Helena having a slight fever and frequent coma. The iliac arteries and veins communicated in the pelvis.

The sacra combined from the second vertebræ downwards. Vulva and anus in common. Urethra single.

CASE V.—C. F. Wolff in *Aota Acad. Scientiarum Petropol. pro anno 1778*, part i., p. 41.

Twier, Russia, 1778. Children (sex not mentioned) lived two months.

Half of the pelves were united, from upper margin to coccyx. Anus was in common. No other data.

CASE VI.—Barkow (*Monstra animalium duplicia per anatomen indagat.*, Lips., 1828) describes two female fœtuses born at full term.

Perineum is common. There are two anuses separated by a septum. Three labia majora; four minora, two of which were larger (the posterior ones), two smaller. Each fœtus has a large and a small one. Vaginæ are separated by a septum. There are two urethræ and two cords. The sacrum is single below the first vertebræ; instead of the bone below, there is but a strong ligament. One fœtus had a large diaphragmatic hernia. Each had but one kidney. One had but one umbilical artery. The two cords were combined in the sacral canal. No nerves, however, originated in this combined part.

CASE VII.—Normand (*Bull. de la Faculté de Médecine de Paris*, 1818, No. 1) reports his "Observations sur deux jumeaux accolés dos à dos."

A woman of thirty years had two children previously. The pygopagus had four nates, one large scrotum, four testicles, one penis, one anus, one urethra, one placenta, and one cord, with two branches.

Meckel (*Müller's Arch.*, 1850) says that two cords have been observed only in fourteen cases of parietal and frontal adhesion, and in the Hungarian sisters. Also in the cases of Barkow and Licetus (Amb. Paré). One of the (male) children was one and one-half inches longer than the other. Extremities, however, were equal. They died on the ninth day.

CASE VIII.—Molitor (*Beob. u. Abh. aus d. Gebiete d. ges. prakt. Heilk. v. oesterreich. ärzten*, 5, Wien, 1826) reports a female pygopagus.

There were one placenta, one cord, with two branches;

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one anus, one urethra. The infants were joined from last lumbar vertebræ to coccyx, and partial union existed between the ossa ilium. The twins were of unequal size, lived twenty-five days, and died in convulsions. No autopsy.

CASE IX.—Chrissie and Millie, born in North Carolina, in 1851.

One of the earliest descriptions is that by Ramsbotham. The children were then five years old. The union had a circumference of sixteen inches, and extended from below the first sacral vertebræ to the coccyx. There is union of the right half of the sacrum of one, and the left of the other infant. There are four tubera, one anus below the coccyx, one blind depression laterally. The single rectum is large, no septum within reach. There are two clitorides, two hymens, two vaginæ, two urethræ. Only two labia majora. The symphyses are distinctly separated. The genital organs are at some distance from each other.

The children can kiss each other; one rests on her back, while the other is on her side. They walk well but not alongside each other. One may be awake when the other sleeps. They are hungry at different times. Pulse is not synchronous. Purgatives take effect only on one. Menstruation is synchronous. Defecation is synchronous, but Münter reports that they can hold their feces separately.

(Virchow in *Berl. Klin. Woch.*, 1873, No. 9. Tardieu *Bull. de l'Acad. de Méd.*, 2 Serie, Tome III., Séance 20th, 1874.)

On the union there is a zone of some centimetres with common sensations. If one be touched, a sensation of something going on is felt by the other girl, but no localization is possible. While the radial pulse is not synchronous, the pulse of the arteries of the feet is, which proves a union of the aorta in the pelvis before branches are given off to the lower extremities.

CASE X.—Joly and Peyrat (*Bull. de l'Acad. de Méd.*, 2 Serie, Tome III.) relate the female pygopagus born in January, 1869, in Mazères, France; one died after ten hours, the other after twenty.

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One of them had a spina bifida. There were two cords and two placentæ, one vulva, one vagina, clitoris, hymen, urethra, anus. The connection of the two bodies reached probably from the first or second sacral vertebræ downwards.

CASE XI.—The Bohemian sisters, Rosalia and Josefa Blazek, born January 20th, 1878, were still exhibited in



Vienna about the latter part of 1892. Breisky, in Prague, and Marchand, of Breslau (*Br. ärztl. Zeitsch.*, 1881, No. 10) furnished descriptions. Their mother was twenty-two years old, and had a female child before.

The faces are turned to one side so that there is a virtual front and back. The girls are well developed,

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both physically and mentally. Very careful examinations were never permitted. The pelves are connected throughout the sacra. There are two gluteal regions. Probably the two spinæ posteriores of the ossa ilium are amalgamated. There is one set of labia majora, but two vaginae; urethra is single, but vulva appears more triangular. The skulls are asymmetrical.

CASE XII.—Two female fœtuses of the ninth month are described in a pamphlet by Friedrich Adolph, of Frankfort-on-the-Main.

Placenta single; cord single up to twenty-four cm., then two branches are given off to forty-five and fifty cm. in length. Total weight of the two fœtuses 4380.0 grammes. They are turned to one side so that it is possible to speak of front and back. There are slight differences in the lengths of the several extremities.

Head asymmetrical. One of them has a large encephalocele of the occiput. Labia majora in common. Sacrum is common from the second vertebræ downwards. Coccyx is single.

The right os ilium of one fœtus and the left of the other are connected, by cartilage above, by fibrous material below, so there is a common incisura ischiadica. The anatomical appearance at the autopsy is such that there probably was no adhesion and conglutination, but a primary formation of but a single sacrum and coccyx.

The sacs of the spinal dura mater of both fœtuses connect above the sacrum, and are single in the canalis sacralis. Inside there is but one cord.

In one fœtus the left umbilical artery did not come from the hypogastric, but directly from the aorta. The lower part of vena cava was double (through persistency of the vena cardinalis). As fœtus No. 1 had but one hypogastric artery, the right being absent, so fœtus No. 2 was without the left. Instead of them there was a large communicating vessel. Fœtus 2 had no umbilical vein. Thus circulation was, similarly to that in the acardiacus, established through the liver of one fœtus. Vulva in common, triangular. Labia minora united. One præputium and frenulum clitoridis. Clitoris not well developed.

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Two vaginae; two hymena; two urethrae; two bladders; two uteri. One of the four kidneys is low down in the pelvis. Recta are double, but united immediately above the anus.

CASE XIII.—Marchand (*Beitr. z. pathol Anat. u. allg. Pathol.*, xvii., p. 1, 1895. Quoted in *Schmidt's Jahrb.*, 1895, No. 6) reports a female pygopagus born dead in the eighth lunar month, after version and difficult extraction, the heads, however, following with facility the extraction of the four upper extremities.

The mother had three previous confinements and one (four months) miscarriage. Union takes place in lower dorsal and pelvic region. The two fœtuses are turned to one side so as to present a common quasi anterior aspect. Fœtus one (left) is forty-seven cm. long, fœtus two (right) forty cm., and has a large occipital encephalocele. Their common weight is 4380 grammes.

There is a common placenta, 650 grammes, of a size twenty-three by eighteen cm. Cord is very thick, its insertion somewhat lateral, single to a distance of twenty-four cm., double afterwards. A branch of forty-five cm. supplies the smaller fœtus, the other of fifty cm., the larger one. Each of these branches has but two blood vessels, one artery and one vein. The two arteries join into one just before the insertion of the cord in the placenta. The coccyx and the larger portion of the sacrum, up to the second sacral vertebrae, are common to both fœtuses. There is union between the sacra, and the left os ilium of fœtus one and the right of fœtus two. The two other ossa ilium are movably united at their posterior margins. This union is cartilaginous above, fibrous below. The lower part of the spinal dura mater is common. The lower part of the cord of fœtus one is arched and joins the smaller one of fœtus two; in this way it enters the sacral canal and forms the filum terminale. There is no actual cauda equina. The two sympathetic nerves join in the pelvis, at the juncture of the vertebral bodies; thus there is a common sympathetic innervation of the pelvic organs. There is a similar union of the vascular systems. The right termination of the aorta of fœtus one does not

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form an umbilical artery, but runs into the left terminal branch of the aorta of fœtus two. In the same way there is a direct connection between the two cardinal veins of both fœtus one and two. The two recta join below and have but one anal aperture, but a small incomplete fistula at the anterior margin of the united anterior labia suggests a second anus. Urinary and sexual organs are double, only the vestibule is single.

Autopsy on Dr. Tynberg's case, made under the supervision of Prof. H. Biggs:

The children died on September 11th, 1895, the left child dying eight hours before the right.

Left Child.—The abdominal cavity was considerably distended, post-mortem discoloration being more marked than in the right. Both children were markedly emaciated, with considerable abrasions around the external genitals. The length of the left child was 48 centimetres; that of the right 50 centimetres. The large intestines, especially the transverse colon, were found markedly distended. From three to four drachms of clear, straw-colored fluid escaped from the abdominal cavity. The mesentery of the transverse colon was relatively very long. The liver extended slightly below free border of ribs and occupied the whole of concavity of diaphragm of both sides, the larger mass being on the left side; the suspensory and round ligaments were situated about one centimetre to left of median line and extended to right and upward of diaphragm. The diaphragm was in the fifth intercostal space of right, and sixth of left side. The stomach lay beneath and in front of the large left lobe. It was very small. The mesentery of caecum was unusually long and free and the sigmoid flexure large. Abdominal organs were otherwise normal in position and character. Uterus, ovaries, bladder and rectum appeared normal from abdominal aspect.

Right Child.—Stomach and liver normal. Large intestine somewhat distended; omentum long; liver extending to free border of ribs. Stomach markedly greater than in left child. Pelvic organs normal in position and character. Between the pelvic cavities there was only fascia and peritoneum; the lower ends of dura mater spinalis

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communicated, both being very much dilated; the spinal cords *not* fused. The bond of union was at lateral masses of sacrum, the latter being unusually developed. It was ligamentous and cartilaginous in character and easily cut through. Dura mater sacs communicated through a space corresponding to the opening in the sacral canal. External genitals could be separated without injury to either.

Each child had its own complete generative organs, and each its distinct circulatory apparatus. The anus was common to both, but was largely situated in the right child. About one-half centimetre above the anus was a well-developed antero-posterior septum, also more closely identified with the right child, and thick enough to form a perfectly normal rectum for each. The cords did not communicate. The cord of the left child was normal; that of the right extended into the sacral canal.

PATENT VENTRICULAR SEPTUM IN A MAN OF TWENTY-NINE YEARS

SAM. R., a Russian, twenty-six years, was taken suddenly ill on July 24, 1891. Dr. H. B. Adler found him gasping with dyspnœa, palpitations, pulse uncountable, generally livid, fingers and toes of deep blue color. There was a loud cardiac murmur, the character of which was not made out, and a fairly normal size of the heart. The patient stated that his lips and nails had been blue, more or less, for twelve or fourteen years. He was given digitalis and felt better after a very few days. Digitalis and potassium iodide were ordered afterwards.

The same medical gentleman saw him on the 12th of February, 1892. Digitalis and the iodide had not been taken. This attack was similar to the first. The heart beats could not be counted; the impulse of the heart was plainly visible. A subcutaneous injection of morphia brought speedy relief; digitalis was given in large doses; and the patient went about his business twelve days after.

He got married the 9th of September, 1893, had a new attack on the 29th and was laid up ten days, and again on the 29th of December, from which it took him several weeks to recover.

He called on me the 2d of March, 1895. Was at that time twenty-nine years old. Living at a distance of three miles, he had to take street-cars and to walk part of the way. He rested an hour before he could see me; had a pulse of 104, small, fairly compressible, complained of palpitation, which he said he had eight years, an occasional pain about his chest, and dyspnœa. His complexion was sallow, his lips blue, finger-nails blue and markedly clubbed, the toe-nails in a similar condition, but to a less degree. The veins of the surface, all visible veins in fact, including the jugular, *not dilated*. No jugular pulse.

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The cardiac dulness *not* at all, or but very little, *extended*. The vertical dimension is somewhat greater. Impulse very strong. There was a very loud systolic murmur (with but little diastolic) over and *about the ensiform process*, less marked at a distance of three centimetres. Its centre was the left margin of the lowest part of sternum.

Diagnosis.—Incompetence of the tricuspid valve, patent ventricular septum, and probably congenital stenosis of pulmonary artery.

The patient presented himself again on the 19th of March. General condition not much changed. Under the influence of digitalis and potassium iodide his complaints were less urgent. It struck me there was a change in the murmur, it was decidedly musical, and I concluded some physical alteration must have taken place about the tricuspid valve or the patent septum. At that time his photograph was taken, after the outlines of the heart had been carefully marked with an ink pencil.

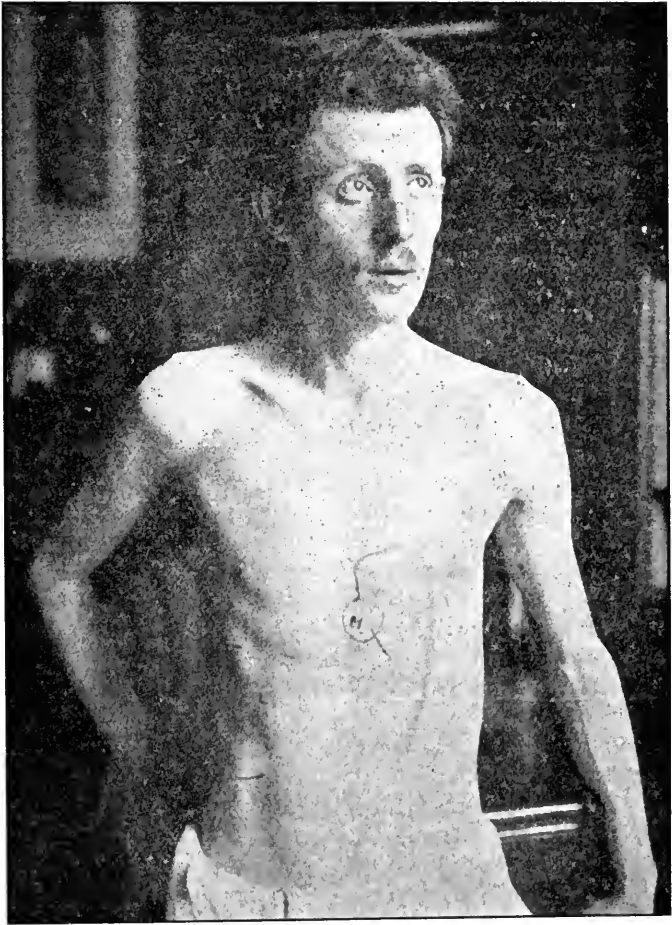
March 26th, I saw the patient in consultation with Dr. H. B. Adler. There had been pulmonary hemorrhages for some days; the blood was liquid, also at times coagulated. Disseminated râles over both lungs, particularly the upper lobes. Heart murmurs still musical, less so, however, than previously, may be either from diminished blood quantity, may be from further local changes. At all events, it appeared to us that a connection was to be found between the sudden origin of the musical sound and the presence of pulmonary hemorrhages which we took to be embolic. Temperature 101° F. No dulness.

April 8th, patient again seen in consultation. Hemorrhages had stopped a week ago. Râles quite extensive, both anteriorly and posteriorly. Bronchophony (more marked than actual bronchial respiration) over left upper lobe, anteriorly, and right infra scapular region. Some dulness on those places. Temperature reached 102° F. but once. A few days previously he complained a whole day of *pain over left ear which lasted a day*.

April 15th, consultation because of an incessant and very severe left supra-orbital neuralgia which had lasted five or six days. Pneumonia, hardly recognizable. No

PATENT VENTRICULAR SEPTUM IN A MAN

elevations of temperature. Occasional twitching of left side of face. Has appeared dull for some days, and more



obstinate than usual. Answers questions slowly and rather stupidly. Complains of forgetting names. Aphasie, says

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spoon when he means bedpan, and makes other mistakes. Neuralgia was, therefore, taken to be of central origin, probably of embolic character, like the previous pneumonias.

April 19th, the patient was transferred to Mount Sinai Hospital, Dr. E. G. Janeway's service. From the hospital records kept by the senior assistant, I copy the following points relating to the history of the patient:

"Remnants of pneumonia still found, heart not enlarged, apex beat fifth space, irregular, systolic murmur at apex transmitted all over, soft and blowing, roughening of the second sound, loudest at fourth space, left. Right facial paralysis—uvula to the right. Temperature 99.2°; pulse 80; respiration 24.

"April 20th, temperature 98.6°; pulse 80; respiration 24. Slept well. Urine 1024, negative.

"April 21st, temperature never over 99.4°; slept well, stupor increasing, neck slightly rigid, areas of dim sensation on right side of face, right hand slightly paralyzed, but its sensitiveness not altered, legs normal—amnesic-aphasia.

"April 22d, temperature not above 98.6°; pulse 68 to 78; twitching of the muscles of left face, sleep good, incontinentia alvi.

"April 23d, temperature 98° to 98.4°; pulse 76 to 80; respiration 24; urine 1023, negative, involuntary. Stupor and rigidity of neck increasing.

"April 24th, 4 A. M., temperature 98°; pulse 78; respiration 24. Slept well till 5.35, became suddenly cyanotic, breathing once a minute. After subcutaneous injection of camphor, atropia and strychnia, respiration increased to four a minute—artificial respiration and oxygen were resorted to until death ensued at 6.15 A. M."

Autopsy the same day at 8 P. M., by the house physician, Dr. Yankauer, under the supervision of Dr. Mandlebaum, pathologist.

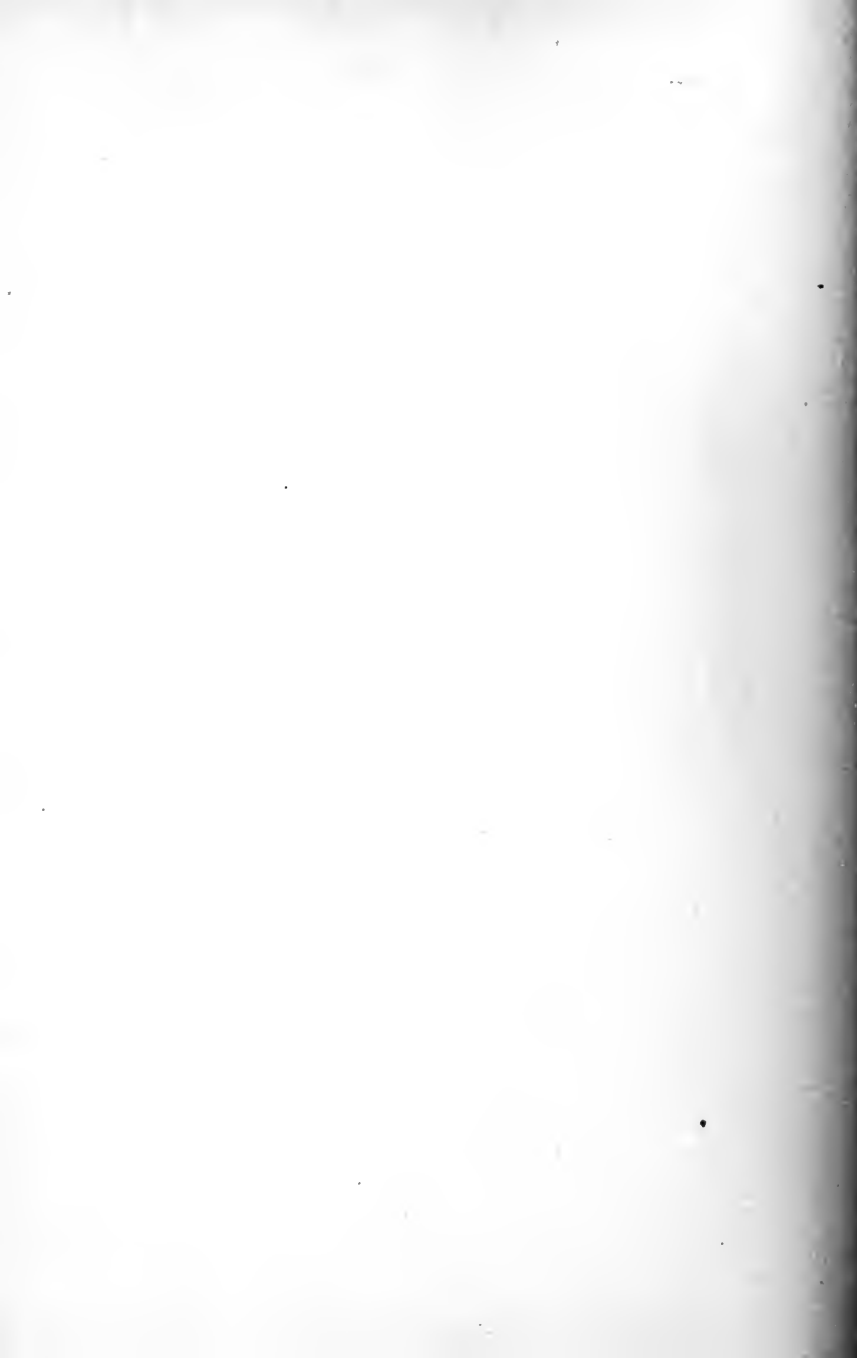
Lungs somewhat emphysematous, no pneumonia—some pleuritis adhesions—liver, spleen, kidneys, abdominal organs generally negative.

Heart slightly enlarged—normal pulmonary artery arises

PATENT VENTRICULAR SEPTUM IN A MAN

from body of right ventricle—no conus arteriosus. The caliber of the aorta is small, the innominata, carotis sinistra, and subclavia are all small and branch off before the arch is formed. Next to the subclavia sinistra there is a small artery directed upwards; probably a vertebral. The left ventricle is small, the right large with eccentric hypertrophy. The ventricular septum, upper part, is patent and admits readily of two fingers. Foramen ovale closed. No ductus Botalli perceptible. Tricuspid valve very much thickened all over and roughened. No recent endocarditis, no thrombi.

Dura mater normal, not adherent. No meningitis. On section of dura the brain bulges out. Brain very soft on left side, normal on right. Pus in posterior horn of left lateral ventricle. It communicates with an abscess extending straight out to upper posterior part of temporo-sphenoidal lobe. It does not perforate the surface of the brain. The cavity is cylindrical, two and a half centimetres wide, five long, the pus (several ounces) thick and greenish. No pus in tympanic cavity, no thrombosis of sinus. The skull shows some softening and fatty degeneration of roof of tympanum, also of mastoid bone.



THORACOPAGUS OMPHALOPAGUS

THE monstrosity described below was secured by Henry Moeller, M.D., of No. 240 West 38th Street, New York, who kindly furnished the following.

HISTORY OF MONSTROSITY BORN JAN. 26, 1891

Father German, 42 years, well-built man with mitral stenosis and cardiac hypertrophy. Mother German-American, 40 years, well-built, perfectly healthy. Married 16 years. Menstruated first when 14 years old. Has given birth to one boy and four girls, all well and well-formed. There have been also a few miscarriages between these five births, none of which were over two months advanced. The youngest is a girl four years old; very bright, and good looking. Father's mother had twins at first birth; they died before the termination of the first year. After that, she gave birth to four boys and two girls, all of whom lived.

Mother's mother had four girls and two boys, all perfect; the boys died during first year. Father's father and mother reached the ages of 68 and 60 years. Mother's father and mother are each 67 years and quite well preserved.

Mother felt peculiar and depressed, while carrying monstrosity, while during all the other pregnancies she felt cheerful and well. All former labors have been normal and not more difficult than the average. On several occasions she got up on third and fourth day, without bad consequences.

At last labor "water broke" twenty-four hours before delivery and all ran off without pains. Twelve hours later, pains commenced and midwife was called, who had attended to her previous confinements. Found head high up and advancing slowly. After 10 hours, presenting head

appeared locked in true pelvis, when my services were required. Found woman exhausted, labia dry, extremities cold, pulse small and frequent; facies bad. Shape of abdomen peculiar, but different from twin pregnancy. No fœtal movements for 10 hours. Applied forceps and brought head down incompletely. Now suddenly a tumor appeared over region of bladder; it was diagnosticated as a second head, and utterly prevented further advance of labor. It was impossible to push the advance of head back and as diagnosis of monstrosity was made by exclusion and no fœtal heart nor movements were detected, head was removed with considerable difficulty, the neck being well up in vagina. Then hand was introduced past stump and legs brought down. Further progress was hindered until the very large abdomen of second fœtus was opened and partly emptied. Now the next legs were brought down and considerable traction and twisting completed delivery after about half an hour's very exhausting work. There was but one placenta, which came away easily.

Laceration had taken place through rectum for about $1\frac{1}{2}$ inches. Parts being very œdematous, did not operate until fifth day, which proved a failure due to very purulent vesical catarrh. After many and copious irrigations of that viscus with 4 per cent. boric acid solution, a second operation proved successful and patient is now attending to her household duties without inconvenience. The os uteri is perfect and remarkably small. The external parts are satisfactory and there is a full-size new perinæum. Patient is of medium size, weighs about 125 pounds. Antero-posterior diameter of pelvis is less than average.

DESCRIPTION OF SPECIMEN

Twins, otherwise well-formed, and of about the usual size of full-term twins, are united at the antero-lateral portion of the chest and upper abdomen. The upper limit of the union is just below the shoulder; the lower just below the umbilicus. It consists of a fusion of the thoracic and abdominal cavities of the two children, not simply of an isthmus of skin and subcutaneous tissue.

THORACOPAGUS OMPHALOPAGUS

There is but one umbilical cord, joining the anterior surface of the line of junction near its lower limit. It is of about the usual size.

The heads and four extremities are normal. Both chil-



FIG. 1.

Anterior view of monster, showing union of the two bodies and the umbilical cord, $\frac{1}{3}$.

dren are females. The accompanying outline drawing represents in a general way their appearance (Fig. 1).

Dissection reveals the following peculiarities:

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There is a single sternum, rather broader than usual. There are two distinct vertebral columns. Fusion, with cartilaginous junction, of the ribs along the posterior portion of the line of union, has occurred.

On opening the abdomen one round ligament is found to run upward from the umbilicus to the liver, carrying a large umbilical vein. Passing downward to the bladders of the two children are two urachi, each carrying its usual hypogastric arteries. The abdominal cavities of the twins connect by a large aperture represented by the antero-posterior diameter of their bodies and by the distance from the umbilicus to the arch of the diaphragm. The greater part of this opening is filled by a large and many-lobed liver, which has apparently resulted from the fusion of the livers of the two bodies, for, although but one gall-bladder and bile duct are discovered, there are two quite distinct portal fissures, each conveying branches of its respective portal vein into the liver, and there are two hepatic veins, each joining the ascending cava of its respective fœtus. The gall bladder is somewhat larger than usual in a new-born child; the only discoverable bile-duct joins the duodenum of the right child.

Fusion of the intestines of the twins has also occurred. Each child has a normally formed œsophagus, stomach and duodenum, but in the upper part of the jejunum the two intestines unite, forming a single common tube throughout almost the entire length of the jejunum and ileum. This common tube is much larger in calibre than either of its component guts. About 10 inches above the lower end of the ileum it divides, forming two entirely separate intestines, each smaller than the common tube and uniting with its respective colon by a perfectly formed ileo-cæcal valve. At the points of this bifurcation of the fused ileum there is a diverticulum about an inch in length resembling in every particular those described as Meckel's diverticula.

The accompanying drawing shows a portion of the common intestine, the point of bifurcation with the diverticulum, the separate ilei, and the ileo-cæcal junction of the left child (Fig. 2).

The fused jejunum and ileum just described is sup-

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ported by a double mesentery. Along the vertebral column of each child the peritoneum folds forward as usual to form the mesentery. The two mesenteries thus formed

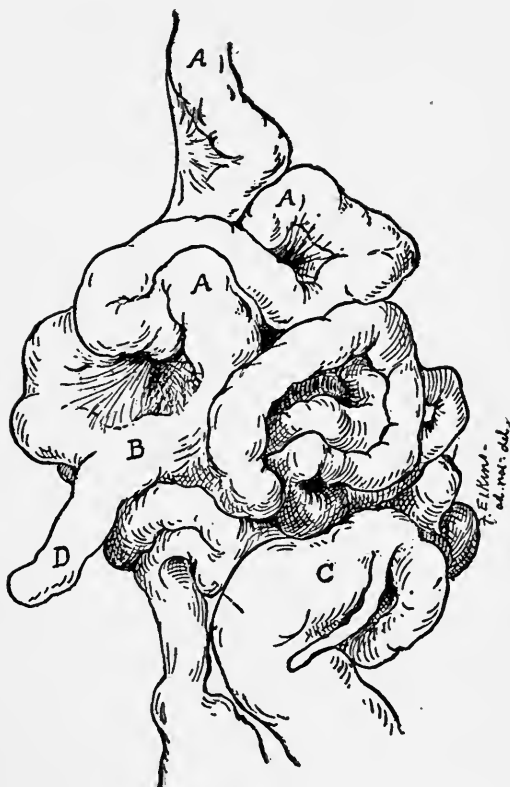


FIG. 2.
Intestine.

Shows the common ileum (A) passing downward to the bifurcation (B), at which point the diverticulum (D) is seen. C = Caput Coli of left child, with its vermiform appendix. Reduce $\frac{1}{2}$.

carry their appropriate mesenteric vessels and approach one another at the intestinal attachment, becoming com-

pletely fused in places, but remaining separate throughout the greater part of the common tube. At the point of bifurcation of the common ileum each mesentery follows its respective gut.

Each child is provided with a perfectly formed cœcum, vermiform appendix, colon, rectum and anus; with a complete set of female generative organs, a spleen, two normally formed kidneys, with their respective ureters, bladders and supra-renal capsules.

A large diaphragm stretches across the bodies of the two twins, separating the abdominal and thoracic cavities.

The common thoracic cavity is occupied by four lungs and a large heart.

Two of the lungs are much larger than the others, those which are anterior and external as regards the monster. The lungs are in two sets, each of which connects in the usual way with its respective trachea. Each is enclosed in a pleural sac.

The heart occupies the centre of the thorax and is evidently the result of fusion of the hearts of the two children. It is broad (5,5 cm.) and somewhat flattened antero-posteriorly (2 cm. antero-posterior diameter). A slight groove on the anterior surface appears to mark the line of fusion of the ventricles of the two hearts, and this same impression of fusion is conveyed by a double apex. The usual breadth of the ventricular mass, and the above-described grooves give to the heart a shape suggestive of a large double strawberry. Above this large ventricular mass is a thin-walled auricular portion, very broad and supporting four auricular appendices, two of which, rather smaller, overlap the ventricle in front, and two others, larger, are behind and at the side.

From the auriculo-ventricular junction, anteriorly and externally, arise two aortæ, each of which passes upward and curves backward and outward to descend along the vertebral column of its respective child, giving off in its course the usual large branches. These aortæ are the only vessels taking origin from the ventricular mass.

On opening the ventricular mass by a transverse cut midway between auriculo-ventricular groove and apex, the

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appearance of three separate ventricles is presented. This is well shown in the accompanying cut (Fig. 4); dissection, however, shows the central and left cavities to communi-

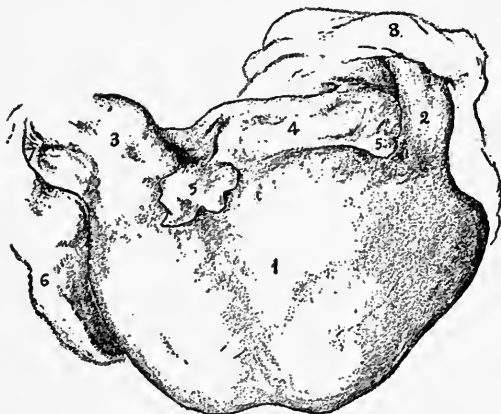


FIG. 3.

Anterior view of heart.

1. Ventricular mass; 2. Left aorta; 3. Right aorta; 4. Auricular mass; 5. Auricular appendices from the anterior ventricle; 6. Auricular appendix from the posterior ventricle; 7. Right rudimentary pulmonary artery; 8. Pericardium turned back.



FIG. 4.

Transverse section of the ventricular mass; seen from below.

1. Left ventricle; 2. Right ventricle.

cate freely, forming in reality one large irregularly-shaped ventricle. This ventricle opens into the left aorta. The

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right ventricle becomes prolonged above into a distinct conus arteriosus and opens into the right aorta.

On opening the auricular mass, a transverse partition is seen dividing it into two cavities. These, however, inter-communicate freely, as will presently be described. The anterior of these auricles is somewhat thicker-walled and gives support to the two smaller auricular appendices already mentioned as visible in the front view of the heart. This auricle communicates by two well-formed auriculo-ventricular openings with the left ventricle, each of which is provided with bicuspid valves. At the two sides of this auricle large veins open, coming from the lungs.

The posterior auricle is thinner-walled and rather more irregular in shape than the other, being large at the right and supporting there a large auricular appendix. This auricle communicates with the right ventricle by an auriculo-ventricular opening provided with a well-formed tricuspid valve. Opening into it are two large vessels, one at either side. These are venous trunks formed in each case by the union of the superior and inferior vena cava in each child.

The interauricular septum is very incomplete, two openings in it admitting of free communication between the auricles. These are large, oval in shape, and appear to be the analogues of the foramen ovale in the fœtal heart. Along one side of each of these is a thin membranous valve, the Eustachian valve, and it is interesting to note that these valves are attached to the adjacent sides of the two openings in such a way as to direct the blood from the venous trunk nearest it into the anterior ventricle. From this arrangement, and from the character of the vessels opening into these auricles and the nature of the auriculo-ventricular valves in each it is evident that the anterior auricle is the analogue of the left auricle in the normal fœtal heart; the posterior, the analogue of the right auricle.

These peculiarities of structure are exceedingly well shown in the drawing (Fig. 5). The posterior wall of the auricular mass has been cut away, disclosing a view of the interior of the posterior auricle and the auricular

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septum. The longer probe passes from the posterior auricle through the right foramen ovale into the anterior auricle, on behind the left foramen ovale, through which it is visible and out through the left pulmonary vein. The shorter probe has been introduced into the posterior auricle through the left common venous trunk. The Eustachian valves

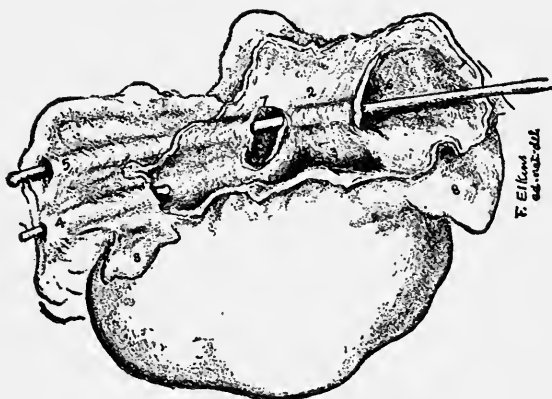


FIG. 5.

Posterior view of heart.

The posterior wall of the auricular mass has been cut away, disclosing a view of the posterior auricle and of the interauricular septum. 1. Ventricular mass; 2. Interauricular septum; 3. is placed just above the auriculo-ventricular opening leading to the right ventricle; 4. Common venous trunks of left side; 5. Pulmonary vein of left side; 6. Right foramen ovale with its Eustachian valve along its left border; 7. Left foramen ovale with its similar valve along its right border; 8. Auricular appendices from posteriore auricle.

may be seen attached to the edges of the partition separating the two foramina.

The absence from this description of any mention of pulmonary arteries must have been noticed. They are, nevertheless, present, though anomalous and rudimentary. Given off from each aorta at about the usual situation of the ductus arteriosus are arteries of considerable size, two

on the right side, one on the left, which are distributed to the lungs. Soon after leaving the aorta these are joined by a large artery lying just underneath and somewhat behind the arch of the aorta on each side. This vessel passes from this point of union downward, inward and forward towards the auriculo-ventricular junction of the heart, but just before reaching this it ends in a blind extremity, where one of them, the right, is provided with distinct but rudimentary semilunar valves. These vessels are believed to be rudimentary pulmonary arteries whose function has been assumed by the ductus arteriosus and perhaps in part also by enlarged bronchial arteries.

A large and fully closed pericardial sac surrounds the heart and the roots of the large vessels connected with it.

THE MUSCLES OF RACHITIC INFANTS

THE muscles of the newborn and of the infant are feeble. The total weight of the muscles of the newborn compared with that of the adult, is one to forty, while the relation of the skeleton is but one to twenty-six. After a while only the dynamometric effect of the child's muscles will increase. Mainly is that so after the sixth year. But even then it is only temporary and not persistent. Nor is their sustaining and persistent strength satisfactory. The frequency of traumatic joint inflammation in infancy and early childhood results from the incompetency of muscular resistance. Falls are very frequent. Squinting is common in small children, simply because their muscles of accommodation and motion are insufficient. Scoliosis is frequent even in infants and children not suffering from or affected by any ailment. Growing pains are often muscular only, and the result of over-exertion.

This is much more evident in those suffering from rachitis. What has been called rachitic pseudo-paralysis by Berg and others is but a confirmation of the fact that the muscular structure is insufficient. This condition may be universal or only a certain class or combination of muscles are the principal sufferers. Strabismus is particularly perceptible in rachitic infants. With it is occasionally combined, or there is found isolated in some instances, nystagmus, which being in such cases the result of the insufficient accommodation is mostly noticed to be bilateral. In many of these exclusively muscular cases there is a motion of the head in the same or opposite direction. An instructive case of the kind was published by Caillé some years ago. Scoliosis is very common in rachitic children and those who have been so.

It is true that rachitic children are apt to be very strong after recovery, but the pressure that children are

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subjected to in our schools, and the expensiveness of fresh air in large cities, and the exposure to indoor life more than one-half of the year in our climate allow but little Easter resurrection to our rachitis-smitten little ones. Resurrection is only preached, and from the pulpits only. Habitual scoliosis of the very young, up to the tenth year, is almost exclusively muscular, mostly dorsal, or sometimes lumbar, with the convexity usually to the left. Not being able here to follow up the cases of school children with their left arm (shoulder forward) on the table, clothing amassed under one gluteus, and defective sight, I refer only to what we see in rachitic babies, particularly when carried on one arm only. More certainly than healthy babies do they grow scoliotic. Even when sitting in their chair, not supported by their own strength, they topple over in one direction or the other. Even before scoliosis occurs there is a general flabbiness of the muscles, which prevents free sitting altogether and causes an apparent or actual kyphosis. The latter is easily distinguished from a spondylitis kyphosis, inasmuch as it does not exhibit the same angular shape. As long as no bones participate in the deformity, the diagnosis can easily be made between that caused by weakness and that resulting from actual bone disease. By raising the baby's heels and hips, while the chest and chin are supported, the apparent curvature depending on the weakened muscles will instantly disappear and lordosis rather than kyphosis will be observed.

The feebleness of the infant's muscles when intensified by rachitic malnutrition is evidenced by nothing better than the symptoms connected with the insufficiency of intestinal muscular tissue in early life, which is exemplified in different ways.

One of the reasons why, for instance, renal disorders are not at all uncommon in the intestinal diseases of early life (the others being, as I have shown, but lately in a paper on "Nephritis of the Newborn," *New York Journal*, January, 1896, the disproportion of the large renal arteries and the small capillaries, and the large size of the intestinal vessels and villi) is the feebleness of the intestinal muscle in the young, which is less capable of ex-

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pling decomposing fæces and toxins. This feebleness of the muscles shows itself, however, still more frequently in another symptom, which is quite common in rachitic children, and even pathognomonic for early rachitis. Take an infant born at full term, with good weight, breast-fed and apparently well and increasing in weight. The bowels are reported to have been regular for four, six or eight weeks, then they become costive. There is no apparent change, the baby does not appear to be sick, is perhaps a little quieter and paler. Even the early cranial changes of rachitis are sometimes not so perceptible as to be positive evidence of that disease. But this constipation is. Go on with the same feeding, air and other surroundings being the same, and more symptoms of rachitis will soon develop.

In order to be certain of your diagnosis of rachitis from this symptom, every other cause of constipation ought to be capable of exclusion; for instance, chronic colitis and peritonitis, deficient or viscid mucus, local atrophy of the intestinal muscle, or stricture of the intestine, perhaps even cystic tumor, though they be excessively rare. The apparent constipation which results from insufficient feeding, either intentional or not, and resulting in starvation; the superabundance of casein in milk, of starch in artificial food; the relative absence of sugar; hardened fæces in the colon; hydrocephalus and other causes of defective innervation. Exclude also the drying up of the intestinal contents by excessive perspiration during the hot summer months, in hot rooms, under heavy clothing, or by diabetes insipidus. After excluding all these possible causes of constipation you will not fail to make your diagnosis of rachitis, which will possibly be confirmed by other symptoms of rachitis if you wait a short while, or rather, and that I prefer, by the effect of anti-rachitic treatment.

The differential diagnosis is also to be made from the form of constipation which I have termed congenital constipation in the same article, *Journal of Obstetrics*, 1860, in which I discussed rachitic constipation. In annual lectures and occasional papers, even in a discourse before the Eleventh International Congress, I have referred to

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the same subject because of its scientific and practical importance. It was not heeded much until some years ago, when foreign publications took up the subject; for instance, Marfan in an essay published in *Arch. Gen. de Med.* a few years ago. The facts are briefly as follows:

The embryological intestine is formed in separate divisions. There is no ascending colon before the fourth or fifth month of foetal life. In the newborn it is very short. In spite of this the large intestine of the mature fœtus is longer in proportion than that of the adult. In the newborn it is three times, in the adult only twice, as long as the body. This is the same proportion that is found for the small intestine, this being twelve times as long as the body in the newborn, eight times as long in the adult.

The ascending colon being very short the surplus of length belongs to the descending colon, especially to the sigmoid flexure. As the pelvis is very narrow, the great length of the lower part of the large intestine causes multiple flexures instead of the single sigmoid flexure of the adult, consequently now and then two or three flexures may be found overlapping and compressing each other. One of them is quite often found in the right side of the pelvis, and not at all as an anomaly, as Cruveilhier and Sappey thought. Huguier found it in that location so often that he proposed to operate for artificial anus on the right side in small infants.

This great length of the colon and the multiplicity of its flexures retard the movement of the intestinal contents, facilitate the absorption of fluids and render the fæces solid. Time and again have I been compelled to manually remove hardened fæces from the recta of babies otherwise normal, and fed exclusively on normal breast milk. The principal points of the differential diagnosis are consequently furnished by the time at which under the same apparently favorable circumstances constipation begins—in the “congenital” form at birth, in the rachitic in the second or third month.

Under the ponderous heading of myasthenia gravis pseudoparalytica Jolly describes in the *Berl. Klin. Woch.*, No. 1, 1895, the case of a boy of fourteen whose voluntary

THE MUSCLES OF RACHITIC INFANTS

muscles exhibited an unusual degree of exhaustibility. All of the extremities suffered, so did the eyes, the neck, the cheeks, the lips. Voluntary action and electrical irritability had the same effect on them; that is, when the former was exhausted the latter was lowered. In a similar case, however, Mosso found that when voluntary action had exhausted the muscles electrical irritability was not lost. In this condition there is neither atrophy nor hypertrophy, and no local disease like that in juvenile muscular dystrophy. This peculiar condition is rather a contrast to myotomy or to the tonic contraction produced in muscles by veratria, physostigmin or digitoxin. It may be compared with the effect of curare. This makes it not improbable that we have to deal here with the results of some chemical alteration in the muscles. Still, both Mosso and Benedict found similar conditions in central disorders. The former goes so far as to speak of a bulbar paralysis not attended with any anatomical lesions.

In several instances many years ago I subjected rachitic children of the second year who could walk to the Faradic and galvanic currents. It appeared to me that when they were tired, the electric current had to be increased. But such patients at that early age are not favorable subjects for experimentation.

The treatment in every such case should begin with rest and with exercise gradually increased. Hydro-therapeutic measures, from warm bathing to cold friction, are indicated. Massage will improve the circulation, and chemism, and arsenic and phosphorus will probably improve the general tissue building. Veratrine, physostigmine, digitoxin in small doses and given frequently may be able to restore or produce the normal tone in the feeble muscles.

A syphilitic pseudo-paralysis of the upper extremities was described by Bednar nearly half a century ago (*Diseases of the Newborn*, vol. iv., p. 227). In sixty-eight cases of hereditary syphilis he met with it sixteen times in the upper extremities, once in the lower, and twice in all of them. He explained it by muscular relaxation of peripheral, not central, origin, and saw it getting better with tumefaction of the bones, under the prolonged use of mercury.

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